STATE OF MISSISSIPPI

HALEY BARBOUR
GOVERNOR

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

TRUDY D. FISHER, EXECUTIVE DIRECTOR

2009 JUL -6 P 12:35

RESTORATION & UNDERGROUND STORAGE TANK BRANCH

June 30, 2009

CERTIFIED MAIL - 70063450000023675907
Mr. Don Williams
Environmental Coordinator
Grenada Manufacturing LLC
635 Highway 332
Grenada, MS 38901

Dear Mr. Williams:

Re: Grenada Manufacturing LLC
Grenada County
Hazardous Waste Ref. No.MSD007037278

Enclosed please find the environmental permit for which the above referenced action has been taken. Please note any limitations, schedules of compliance, monitoring requirements, and monitoring reporting dates found in this permit.

MSD007037278 is issued in accordance with the provisions of the Mississippi Solid Waste Disposal Act of 1974 (Sections 17-17-1, et seq., Mississippi Code of 1972). Any appeal of these permit actions must be made within the 30-day period provided for in Section 49-17-29(4)(b) Mississippi Code of 1972.

Sincerely,

Toby M. Cook

Toby M. Cook, P.E., Chief
Chemical Manufacturing Branch
Environmental Permits Division

CC: Don Webster USEPA

OFFICE OF POLLUTION CONTROL
POST OFFICE BOX 2261 • JACKSON, MISSISSIPPI 39225-2261• TEL: (601) 961-5171 • FAX: (601) 354-6612 • www.deq.state.ms.us
AN EQUAL OPPORTUNITY EMPLOYER

650053

STATE OF MISSISSIPPI
HAZARDOUS WASTE MANAGEMENT
PERMIT

THIS CERTIFIES THAT

Grenada Manufacturing, LLC
635 Highway 332
Grenada, MS
Grenada County
MSD 007 037 278

is hereby authorized to conduct post closure care for a closed surface impoundment

This permit is issued under the authority of the Mississippi Solid Wastes Disposal Law, and particularly Section 17-17-27 thereof, and rules adopted and promulgated thereunder, all of which authorize the Department of Environmental Quality to enforce all applicable requirements, under the Mississippi Hazardous Waste Management Regulations, and associated conditions included therein.

Permit Issued: JUN 2 4 2009

MISSISSIPPI ENVIRONMENTAL QUALITY PERMIT BOARD

AUTHORIZED SIGNATURE
MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY

Permit No.: MSD007037278

Expires: May 31, 2019

650053

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LIST OF ATTACHMENTS

MODULE 1 – GENERAL PERMIT CONDITIONS

I.A EFFECT OF PERMIT

Subject to MHWMR 270.4, compliance with this permit constitutes compliance, for purposes of enforcement, with Subtitle C of the Resource Conservation and Recovery Act (RCRA). Issuance of this permit does not convey property rights of any sort or any exclusive privilege; nor does it authorize any injury to persons or property, and invasion of other private rights, or any infringement of state or local law or regulations or preclude compliance with any other Federal, State, and/or local laws and/or regulations governing the treatment and handling of explosives. Compliance with the terms of this permit does not constitute a defense to any order issued or any action brought under Section 3008(a), Section 3008 (h), Section 3013, of Section 7003 of RCRA; Sections 106(a), 104 or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9601 et seq., commonly known as CERCLA) or any other law providing for protection of public health or the environment.

I.B. PERMIT ACTIONS

I.B.1 Permit Modification, Revocation and Reissuance, and Termination

This permit may be modified, revoked and reissued, or terminated for cause as specified in MHWMR Part 270.41; 270.42; 270.43; and 270.50(d). The filing of a request for a permit modification, revocation and reissuance or termination, or the notification of planned changes or anticipated noncompliance on the part of the Permittee does not stay the applicability or enforceability of and permit conditions.

I.B.2 Permit Renewal

This permit may be renewed as specified in MHWMR 270.30(b) and Permit Condition 1.E.2. Review of any application for a permit renewal shall consider improvements in the state of control and measurement technology, as well as changes in applicable regulations.

I.C. SEVERABILITY

The provisions of this permit are severable, and if any provisions of this permit, or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I.D. DEFINITIONS

For purposes of this permit, terms used herein shall have the same meaning as those in MHWMR Parts 124, 260, 264, 268 and 270, unless this permit specifically provides otherwise; where terms are not defined in the regulations or the permit, the meaning associated with such terms shall be defined by a standard dictionary or the generally accepted scientific or industrial meaning to the term. "Executive Director" means the Executive Director of MDEQ, or his designed or authorized representative.

I.E. DUTIES AND REQUIREMENTS

I.E.1. Duty to Comply

The Permittee shall comply with all conditions of this permit, except to the extent and for the duration such noncompliance is authorized by an emergency permit. Any permit noncompliance, other than noncompliance authorized by an emergency permit, constitutes a violation of RCRA and is grounds for enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application.

I.E.2. Duty to Reapply

If the Permittee wishes to continue an activity allowed by this permit after the expiration date of this permit, the Permittee shall submit a complete application for a new permit at least 180 prior to permit expiration.

I.E.3. Permit Expiration

Pursuant to MHWMR Part 270.50, this permit shall be effective for a fixed term not to exceed ten years. This permit and all

conditions herein will remain in effect beyond the permit's expiration date, if the Permittee has submitted a timely, complete application and, through no fault of the Permittee, the Executive Director has not issued a new permit, as set fourth in MHWMR 270.51.

I.E.4. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

I.E.5. Duty to Mitigate

In the event of noncompliance with the permit, the Permittee shall take all reasonable steps to minimize releases to the environment and shall carry out such measures as are reasonable to prevent significant adverse impacts on human health or the environment.

I.E.6. Proper Operation and Maintenance

The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance includes effective performance, adequate funding, adequate staffing and training, adequate laboratory and process controls, including appropriate quality assurance/quality control procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance with the conditions of the permit.

I.E.7. Duty to Provide Information

The Permittee shall furnish to the Executive Director, within a reasonable time, any relevant information which the Executive Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also

furnish the Executive Director, upon request, copies of records required to be kept by this permit.

I.E.8. Inspection and Entry

Pursuant to MHWMR 270.30(i), the Permittee shall allow the Executive Director, or an authorized representative, upon the presentation of credentials and other documents, as may be required by law, to:

I.E.8.a. Enter, at reasonable times, upon the Permittee's premises where a regulated activity is located or conducted, or where records must be kept under the conditions of this permit;

I.E.8.b. Have access to and copy, at reasonable times, any records that must be kept under the condition of the permit;

I.E.8.c. Inspect at reasonable times any facility, equipment (including monitoring and control equipment), practices, operations regulated or required under this permit; and

I.E.8.d. Sample or monitor, at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by RCRA, any substances or parameters at any location.

I.E.9. Monitoring and Records

The Executive Director may require such testing by the Permittee, and may make such modifications to this permit, deemed necessary to ensure implementation of new regulations or requirements, or to ensure protection of human health and the environment.

I.E.9.a. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. The method used to obtain a representative sample of the wastes to be analyzed must be the appropriate method from appendix I of MHWMR Part 261, the EPA Region IV Environmental Compliance Branch's Standard Operating Procedure and Quality Assurance Manual (SOP) (most recent version), or an

equivalent method approved by the Executive Director. Laboratory methods must be those specified in Test Methods for Evaluating Solid Waste: Physical/Chemical Methods SW-846, Standard Methods of Wastewater Analysis, or an equivalent method approved by the Executive Director.

I.E.9.b. The Permittee shall retain records of all monitoring information, including all calibration and maintenance records, records of all data used to prepare documents required by this permit, copies of all reports and records required by this permit, the certification required by MHWMR 264.73(b)(9), (should there be any generation fo hazardous waste), and records of all data used to complete the application for this permit for a period of at least 3 years from the date of the sample, measurement, report, record, certification, or application. These periods may be extended by the Executive Director at any time and are automatically extended during the course of any unresolved enforcement action regarding this facility. The Permittee shall also maintain records for all groundwater monitoring wells and associated groundwater surface elevations for the duration of the post-closure care period. All records required by this condition shall be maintained at the facility or at the office of the facility contact.

I.E.9.c. Records of monitoring information shall specify:

i. The dates, exact place, and times of sampling or measurements;

ii. The individuals who performed the sampling or measurements;

iii. The dates the analyses were performed;

iv. The individuals who performed the analyses;

v. The analytical techniques or methods used; including any method detection limits for said technique; and

vi. The results of such analyses

I.E.10. Reporting Planned Changes

The Permittee shall give notice to the Executive Director as soon as possible of any planned physical alterations or additions to the permitted facility.

I.E.11. Anticipated Noncompliance

The Permittee shall give advance notice to the Executive Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

I.E.12. Transfer of Permits

This permit is not transferable to any person, except after notice to the Executive Director. The Executive Director may require modification or revocation and reissuance of the permit pursuant to MHWMR 270.40. Before transferring ownership or operation of the facility, the Permittee shall notify the new owner or operator in writing of the requirements of MHWMR parts 264 and 270 and of this permit.

I.E.13. Twenty-Four Hour Reporting

I.E.13.a. The Permittee shall report to the Executive Director any noncompliance with the permit, spill, accident or other occurence which may endanger health or the environment. (Note: the Permittee shall advise neighboring members of the community and City and County emergency response officials as soon as possible). Any such information shall be reported orally to the Executive director within twenty-four (24) hours from the time the Permittee becomes aware of the circumstances. This report shall include the following:

i. Information concerning release of any hazardous waste that may cause an endangerment to public drinking water supplies.

ii. Any information of a release or discharge of hazardous waste, or of a fire or explosion from the hazardous waste management facility which could threaten the environment

of human health outside the facility.

I.E.13.b. The description of the occurrence and its cause shall include:

i. Name, address, and telephone number of the owner or operator;

ii. Name , address, and telephone number of the facility;

iii. Date, time, and type of incident;

iv. Name and quantity of materials involved;

v. The extent of injuries, if any

vi. An assessment of actual or potential hazard to the environment and human health outside the facility, where this is applicable; and

vii. Estimated quantity and disposition of recovered material that resulted from the incident.

I.E.13.c. A written submission shall also be provided within five days of the time the Permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period(s) of noncompliance (including exact dates and times); whether the noncompliance has been corrected; and if not, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance. The Executive Director may waive the five-day written notice requirement in favor of a written report within 15 days.

I.E.14. Other Noncompliance

Whenever the Permittee becomes aware that it failed to submit any relevant facts or submitted incorrect information in any document(s) submitted to the Executive Director, the Permittee shall promptly submit such facts or information.

I.E.15. Obligation for Corrective Action

The Permittee is required to continue this permit until completion of the post-closure care period.

I.E.16. Other Information

Whenever the Permittee becomes aware that it failed to submit relevant facts in the permit application or in any report to the Executive Director, the Permittee shall promptly submit such facts or information.

I.F. SIGNATORY REQUIREMENT

All applications, reports, or information submitted to the Executive Director shall be signed and certified in accordance with MHWMR 270.11.

I.G REPORTS, NOTIFICATIONS, AND SUBMISSTIONS TO THE EXECUTIVE DIRECTOR

All reports, notifications, or other submissions which are required by this permit to be sent to or given to the Executive Director should be sent by certified mail or given to:

Mississippi Department Of Environmental Quality
P.O. Box 2261
Jackson, MS 39225

I.H. CONFIDENTIAL INFORMATION

In accordance with MHWMR Part 270.12, the Permittee may claim confidential any information required to be submitted by this permit.

I.I. PERMIT REVIEW PERIOD

This permit shall be reviewed by the Executive Director five (5) years after the date of issuance and modified as necessary as required under MHWMR 270.50(d).

MODULE II – GENERAL FACILITY CONDITIONS

II.A. FACILITY DESCRIPTION

This permit is issued to Grenada manufacturing, LLC for their Grenada Mississippi Facility [MSD 007 037 278] as described in the permit application submitted on June 3, 2008 ; and hereinafter referred to as "the application." The permit authorizes the Permittee to conduct post closure activities.

II.B. DESIGN AND OPERATION OF FACILITY

The Permittee shall maintain and operate the facility to minimize the possibility of fire, explosion, or any unplanned, sudden or non-sudden release of hazardous waste or hazardous waste constituents to air, soil, or surface water which could threaten human health or the environment, as required by MHWMR 264.31.

II.C. REQUIRED NOTICES

II.C.1. Hazardous Waste Imports

The Permittee shall not receive hazardous waste from a foreign source.

II.C.2. Hazardous Waste from Off-Site Sources

The Permittee shall not receive hazardous waste from an off-site source.

II.C.3. Transfer of Permit

Before transferring ownership or operation of the facility, the owner or operator must notify the new owner or operator in writing of the requirements of MHWMR Parts 264 and 270.

II.D. SECURITY

The Permittee shall comply with the security provisions of MHWMR Section 264.14(a) as described in the application.

II.E. GENERAL INSPECTION REQUIREMENTS

The Permittee shall comply with the inspection requirements of MHWMR Section 264.15 and follow the inspection schedule contained in permit Attachment B, the Post-Closure Care Plan. The Permittee shall remedy any deterioration or malfunction discovered by an inspection, as required by

MHWMR 264.15 (c). Records of inspections shall be kept as required by MHWMR 264.15(d).

II.F. GENERAL WASTE ANALYSIS

Not applicable to a closed facility.

II.G. SPECIAL CONDITIONS

Where a discrepancy exists between the wording of an item in the application and this permit, the permit requirements take precedence over the application.

II.H LOCATION STANDARD

The Permittee shall provide protection from washouts of hazardous waste from the units specified in Condition II. A. by providing maintenance to the final cover on an "as-needed" basis.

II.I. GENERAL POST-CLOSURE REQUIREMENTS

II.I.1. Post-Closure Care Period

The Permittee shall conduct post-closure care for the closed surface impoundment after completion of closure of the unit and continue for 30 years after that date. Post-closure care of the unit shall be in accordance with MHWMR 264.117 and the Post Closure Plan.

II.I.2. Amendment to Post-Closure Plan

The Permittee shall request a permit modification and amend the post closure plan, whenever necessary, in accordance with MHWMR Section 264.118(d). the director may shorten or Lengthen the post-closure care period in accordance with MHWMR 264.117(a)(2). The Permittee shall request and obtain a permit modification prior the post-closure removal of hazardous wastes, hazardous waste residues, liners or containment soils in accordance with MHWMR 264.119(c).

II.I.4. Certification of Completion of Post-Closure Care

The Permittee shall certify that post-closure care was performed in accordance with the specifications in the Post-Closure Plan, Permit Attachment B, as required by MHWMR 264.120.

II.J. COST ESTIMATE FOR FACILITY POST-CLOSURE and CORRECTIVE ACTION

II.J.1. The Permittee's most recent post-closure cost estimate is contained in the application.

II.J.3. The Permittee must revise the post-closure cost estimate whenever there is a change in the facility's post-closure plan.

II.J.4. The Permittee must keep at the facility, or at a mutually agreed upon location, the latest post-closure cost estimate.

II.K. FINANCIAL ASSURANCE FOR FACILITY POST-CLOSURE

The Permittee shall demonstrate continuous compliance with MHWMR 264.145 by providing documentation of financial assurance, as required by MHWMR Section 264.151, in at least the amount of the cost estimate required by Condition II.J. Changes in financial assurance mechanisms must be approved by the Executive Director pursuant to MHWMR Section 264.145.

II.L. OPERATING RECORD

Pursuant to MHWMR Part 264.73(a), the Permittee must keep a written operating record of post-closure care activities and those activities specified in MHWMR Part 264.73(b)(6). These records will be maintained at the facility or in the custody of the facility contact person, and shall be made available upon request. At a minimum, the following information must be recorded and maintained in the operating record:

- Records of inspections
- Monitoring, testing and analytical data
- Groundwater monitoring data

II.M. INCAPACITY OF OWNERS OR OPERATORS, GUARANTORS, OR FINANCIAL INSTITUTIONS

The Permittee shall comply with MHWMR 264.148 whenever necessary.

II.N. ANNUAL REPORT

The permittee shall report, by March 1 of each year, the types and amounts of hazardous waste treated, stored, recycled, and/or disposed during the preceding calendar year, per the requirements of MHWMR 264.S1, when applicable.

MODULE III – POST-CLOSURE CARE

III.A. APPLICABILTY

The Permittee shall provide post-closure care for the closed equalization lagoon (surface impoundment) unit described in Attachment A, in accordance with MHWMR 264.110.

III.B. POST-CLOSURE PROCEDURES AND USE OF PROPERTY

III.B.1. The Permittee shall conduct post-closure care for land disposal units, to begin after completion of closure of the system and continue for 30 years after the date, except that the 30-year post-closure care period may be shortened upon application and demonstration approved by MDEQ that the facility is secure, or may be extended by MDEQ if the Executive Director or his authorized representative finds this is necessary to protect human health and the environment.

III.B.2. The Permittee shall maintain and monitor the ground-water monitoring system and comply with all other applicable requirements of MHWMR 264, Subpart F during the post-closure period.

III.B.3. The Permittee shall comply with the requirements for land disposal units as follows:

III.B.3.a. Maintain the integrity and effectiveness of the final cover, including making repairs to the cap, as necessary, to correct the effects of settling, subsidence, erosion and other events. Vegetative growth shall not exceed two feet in height, and woody shrubs or trees shall be eliminated. Other maintenance shall take place per the requirements of the Post-Closure Plan, Permit Attachment B;

III.B.3.b. Maintain drainage control structures, benchmarks, security devices, and monitoring wells;

III.B.3.c. Prevent run-on and run-off from eroding or otherwise damaging the final cover;

III.B.3.d. Maintain and monitor the groundwater monitoring system and comply with all other applicable requirements of Subpart F of MHWMR Part 264.

III.B.3.e. Any gas vents shall be maintained so that they are free of cracks or breaks, and the outlets shall be free of obstructions.

III.B.3.f. All surveyed benchmarks shall be maintained.

III.B.4. The Permittee shall comply with all security requirements, as specified in Permit Attachment B.

III.B.5. The Permittee shall not allow any use of the units designated in Condition III.A., which will disturb the integrity of the final cover, or the function of the facility's monitoring system during the post-closure care period.

III.B.6. The Permittee shall implement the Post-Closure Plan, Permit Attachment B. All post-closure care activities must be conducted in accordance with the provisions of the Post-Closure Plan and this permit.

III.C. INSPECTIONS

The Permittee shall inspect the components, structures, and equipment at the site in accordance with the Inspection Schedule described in Permit Attachment B.

III.D. NOTICES AND CERTIFICATION

III.D.1. If the Permittee or any subsequent owner or operator of the land upon which the hazardous waste disposal unit is located, wishes to remove hazardous wastes and hazardous waste residues; or contaminated soils, then he shall request a modification to this post-closure permit in accordance with the applicable requirements in MHWMR Parts 124 and 270. The Permittee or any subsequent owner or operator of the land shall demonstrate that the removal of hazardous wastes will satisfy the criteria of MHWMR 264.117(c).

III.D.2. No later than sixty (60) days after completion of the established post-closure care period for each disposal unit, the Permittee shall submit to the Executive Director, by registered mail, a certification that the post-closure care for the hazardous waste

disposal unit was performed in accordance with the specifications in the approved Post-Closure Plan. The certification must be signed by the Permittee and an independent, professional engineer registered in the State of Mississippi. Documentation supporting the independent, professional engineer's certification must be furnished to the Executive Director upon request until the Executive Director releases the Permittee from the financial assurance requirements for post-closure care under MHWMR 264.145(i).

III.E. FINANCIAL ASSURANCE

The Permittee shall maintain financial assurance during the post-closure period and comply with all applicable requirements of MHWMR 264, Subpart H.

III.F. POST-CLOSURE PERMIT MODIFICAITONS

The Permittee must request a permit modification to authorize a change in the approved Post-Closure Plan. This request must be made in accordance with applicable requirements of MHWMR Parts 124 and 270, and must include a copy of the proposed amended Post-Closure Plan for approval by the Executive Director. The Permittee must submit a written request for a permit modification at least 60 days prior to the proposed change in facility design or operation, or no later than 60 days after an unexpected event has occurred which has affected the Post-Closure Plan.

MODULE IV – GROUNDWATER PROTECTION

IV.A. APPLICABILITY

The requirements of this part apply to the closed equalization lagoon surface impoundment unit as depicted in Permit Attachment A.

IV.B. MONITORING PROGRAM

The Permittee shall conduct groundwater corrective action/compliance monitoring as described in Attachment C, the closed Equalization Lagoon Groundwater Monitoring Plan (contained in Permittee's June, 2006 Quality Assurance Project Plan), and as described in this permit, in accordance with the requirements of MHWMR 264.91 (a)(3) and 264.100. The monitoring program will remain in effect throughout the term of this permit unless the permit is modified under Condition IV.P.4.

When the concentrations of all hazardous constituents under Condition IV.D. have not exceeded the ground water protection standards under Condition IV.C. along the point of compliance and in all compliance monitoring wells for a period of three consecutive years, the Permittee may petition the Executive Director for a permit modification to conduct a detection monitoring program or post-closure ground water monitoring program.

IV.C. GROUND WATER PROTECTION STANDARDS

The ground water protection standards under MHWMR Section 264.92 shall be equal to concentration limits in Condition IV.D. of this permit during the compliance monitoring program. The Permittee may petition the Executive Director for a permit modification during the compliance period to establish groundwater protection standards based on alternate concentration limits under MHWMR 264.94(b).

IV.D. HAZARDOUS CONSTITUENTS/CONCENTRATION LIMITS

The ground water protection standards in Condition IV.C. of this permit shall be based on the following concentration limits, as required under MHWMR 264.94. The analytical methods and method detection limits shall be designated in all reports of analyses.

Hazardous Constituents	**Concentration Limits (µg/l)**
Arsenic	50
Chromium (total)	100

Selenium	50
Lead	15
Chromium (Hexavalent)	10
Vinyl Chloride	2
Chloroethane	5
Methylene Chloride	5
Acetone	5
Carbon Disulfide	5
1,1-Dichloroethene	7
1,1-Dichloroethane	5
Trans1,2-dichloroethene	100
Cis-1,2-dichloroethene	70
1,2-Dichloroethane	5
1,1,1-Trichloroethane	200
1,2-Dichloropropane	5
Trichloroethene	5
1,1,2-Trichloroethane	5
Benzene	5
Tetrachloroethene	5
Toluene	1000
Ethylbenzene	700
Xylenes (Total)	10,000
1,2,4-Trichlorobenzene	70
Naphthalene	10
2-Methylnaphthalene	10
Pentachlorophenol	1
Bis(2-Ethylhexyl)phthalate	6
1,2,4,5-Tetrachlorobenzene	10

IV.E. POINT OF COMPLIANCE

As specified in MHWMR 264.95, the point of compliance for the waste management unit is represented by a vertical surface located at the hydraulically down gradient limit of the waste management area, and which extends down vertically into the uppermost aquifer beneath the closed surface impoundment unit.

IV.F. COMPLIANCE PERIOD

The compliance period, during which the ground water protection standard applies, shall be defined to begin with the effective date of this permit and continue until the ground water protection standard for all constituents specified in Permit Condition IV.D. have not been exceeded in all of the compliance monitoring wells for a period of three (3) consecutive years.

IV.G. GROUND WATER MONITORING SYSTEM

The Permittee shall maintain a ground water monitoring system to comply with the requirements of MHWMR 264.95, 264.97 and 264.100. These wells shall be maintained at the locations depicted in Figure 2, Attachment A.

IV.G.1. Well Replacement

Should the Permittee determine during an inspection or sampling event that any well identified in Condition V.H. has been damaged such that it no longer meets the requirements of MHWMR 264.97(a)(1), (2) and (c), the Permittee shall notify MDEQ in writing within seven (7) days of making such a determination and replace or repair the damaged well within thirty (30) days. Replacement wells should be constructed to the same specifications as the well being replaced.

IV.G.2. Compliance Monitoring Wells

For the purpose of this permit, wells RT-2, RT-4, and RT-5 shall be designated as the compliance point monitoring wells.

IV.G.3. Background Monitoring Wells

For the purpose of this permit, monitoring well MW-23 shall be designated as the background monitoring well.

IV.H. GROUND WATER MONITORING REQUIREMENTS

The Permittee shall determine the ground water quality annually at each compliance point monitoring (RT-2, RT-4, RT-5) and the background monitoring well (MW-23) for the **underlined** parameters in Condition IV.D.

IV.I. SAMPLING AND ANALYSIS PROCEDURES

IV.I.1. Prior to collecting ground water samples from any monitoring well, the Permittee shall measure the water level in the well, calculate the volume of water in the well and purge the well using the procedures specified in the Groundwater Sampling and Analysis Plan, Permit Attachment C.

IV.I.2. The Permittee shall collect ground water samples in accordance with the procedures set fourth in Permit Attachment C.

IV.I.3. Ground water samples shall be preserved and shipped in accordance with the procedures specified in Permit Attachment C.

IV.I.4. Ground water samples shall be tracked and controlled using the samples identification procedures and chain-of-custody procedures specified in Permit Attachment C.

IV.I.5. Samples shall be analyzed in accordance with the procedures (methods) specified in accordance with the analytical methods, including appropriate QA/QC measures, as specified in the Groundwater Monitoring Plan, Permit Attachment C.

IV.J. ELEVATION OF THE GROUND WATER SURFACE

The Permittee shall determine and record the ground water surface elevation at each monitoring well, using the procedures described in Permit Attachment C, each time ground water is sampled in accordance with Permit Condition IV.I.

IV.K STATISTICAL PROCEDURE

When evaluating monitoring results for hazardous constituents listed in IV.D., the Permittee shall compare the measured constituents at each well to the concentration limit specified in Condition IV.D.

IV.L. MONITORING PROGRAM AND DATA EVALUATION

IV.L.1. The Permittee shall determine the ground water flow rate and direction in the uppermost aquifer at least annually.

IV.L.2. The Permittee shall determine the ground water concentration of underlined hazardous constituent(s) listed in Condition IV.D. at compliance and monitoring wells listed in Table IV-1 during the compliance period.

IV.L.3. For each underlined hazardous constituent identified in Condition IV.D., the Permittee shall compare the measured constituent concentration, at each compliance well, to the concentration limit specified in Condition IV.D. for the compliance monitoring period specified in Condition IV.F. In accordance with MHWMR 264.99(i), the Permittee may demonstrate that any exceedance of the groundwater protection standard is due to a release from a source other than the regulated unit, or an error in sampling, analysis, or evaluation.

IV.L.4. The Permittee shall perform the evaluation required by Condition IV.M.3. within sixty (60) days from the receipt and evaluation of the final QA/QC reviewed analytical results.

IV.L.5. Upon completion of the compliance monitoring period, the Permittee may petition the Executive Director for a permit modification to conduct a detection monitoring program as specified in Condition IV.B.

IV.L.6. If the Permittee or the Executive Director determines that the corrective action/compliance monitoring program no longer satisfies the requirements of MHWMR 264.99 and/or 264.100, the Permittee must submit a permit modification application within 90 days of the determination detailing appropriate changes to the compliance monitoring program.

IV.M. REPORTING AND RECORDKEEPING

IV.M.1. The Permittee shall enter all monitoring, testing, and analytical data obtained pursuant to Module IV, in the operating record as required by MHWMR 264.73(b)(6).

IV.M.2. During the period of compliance monitoring and corrective action, the Permittee shall submit to the executive Director annually the information required by Conditions IV.I., IV.K., IV.L., and IV.M.. The required report may be exclusively for the closed equalization lagoon, or it may be a part of a more comprehensive groundwater report for the site.

IV.M.3. The Permittee shall report concentrations of any additional Appendix IX constituents (i.e. not listed in Condition IV.D.) to the Executive Director within seven (7) days from receipt and review of the final QA/QC reviewed analytical results from the re-sampling (i.e. confirmatory) event.

MODULE V – CORRECTIVE ACTION FOR REGULATED UNITS

APPLICABILITY

There are numerous Solid Waste Management Units (SWMUs) and Areas of Concern (AOC) at the site, including the state-regulated closed equalization lagoon. Due to the scope of releases from the SWMUs and AOCs, and the intermingling of the contaminant plumes, a site-wide remediation technology is being applied at the site. The remedial technology in operation is the zero-valent-iron permeable reactive barrier, which has been installed at the site as shown on the Site Plan in Permit Attachment A. Operation and monitoring of the reactive barrier shall be under the oversight of the United States Environmental Protection Agency, and in accordance with any permit issued thereby. Compliance with USEPA requirements for site-wide groundwater remediation shall be deemed to fulfill groundwater corrective action requirements that may be related to the closed equalization lagoon.

MODULE VI – LAND DISPOSAL RESTRICTIONS

VI.A. GENERAL RESTRICTIONS

MHWMR 268 identifies hazardous wastes that are restricted from land disposal and defines those limited circumstances which an otherwise prohibited waste may continue to be placed on or in a land treatment, storage or disposal unit. The Permittee shall maintain compliance with the requirements of MHWMR 268. Where the Permittee has applied for an extension, waiver or variance under MHWMR 268, the Permittee shall comply with all restrictions on land disposal under this Module once the effective date for the waste has been reached pending final approval of such application.

VI.B. LAND DISPOSAL PROHIBITIONS AND TREATMENT STANDARDS

VI.B.1. A restricted waste identified in MHWMR Part 268, Subpart C may not be placed in a land disposal unit without further treatment unless the requirements of MHWMR 268, Subparts C and/or D are met.

VI.B.2. The storage of hazardous wastes restricted from land disposal under MHWMR 268 is prohibited unless the requirements of MHWMR 268, Subpart E are met.

MODULE VII – ORGANIC AIR EMISSIONS REQUIREMENTS OF PROCESS VENT AND EQUIPMENT LEAKS

VII.A. GENERAL INTRODUCTION

In the June 21, 1990, Federal Register, EPA published the final rule for Phase I Organic Air Emission Standards (40 CFR Parts 264 and 265, Subparts AA and BB) for hazardous waste treatment, storage and disposal facilities. The State of Mississippi adopted these regulations in September, 1990. Subpart AA contains emission standards for process vents associated with distillation, fractionation, thin-film evaporation, solvent extraction and air or steam stripping operations that process hazardous waste with an annual average total organic concentration of at least ten (10) part per million (ppm) by weight. Subpart BB contains emission standards that address leaks from specific equipment (i.e. pumps, valves, compressors and etc.) that contains or contacts hazardous waste that has an organic concentration of at least ten (10) percent by weight.

VII.B. ORGANIC AIR EMISSION STANDARDS

Prior to constructing any equipment with process vents subject to the requirements of MHWMR 264, Subpart AA or installing any additional equipment subject to the requirements of MHWMR 264, Subpart BB, the Permittee shall supply the specific Part B information required pursuant to MHWMR 270.24 and 270.25, as applicable.

MODULE VIII – WASTE MINIMIZATION

VIII.A. APPLICABILITY

No less than one year from the date of the future generation of hazardous waste and pursuant to MHWMR 264.73(b)(9); Section 3005(h) of RCRA, 42 U.S.C. 6925(h); and Section 49-31-1 et seq., Mississippi Code of 1972; the Permittee must certify, no later than annually, that:

VIII.A.1. The Permittee has a program in place to reduce the volume and toxicity of hazardous waste generated to the degree determined by the Permittee to be economically practicable; and

VIII.A.2. The proposed method of treatment, storage or disposal is the most practical method available to the Permittee which minimizes the present and future threat to human health and the environment.

VIII.B. WASTE MINIMIZATION CERTIFICATION OBJECTIVES

Any future waste minimization program under Condition VIII.A. should include the following elements:

A. Top Management Support

i. Dated and signed policy describing management support for waste minimization and for implementation of a waste minimizing plan.

ii. Description of employee awareness and training programs designed to involve employees in waste minimization planning and implementation to the maximum extent feasible.

iii. Description of how a waste minimization plan has been incorporated into management practices so as to ensure ongoing efforts with respect to product design, capital planning, production operations and maintenance

B. Characterization of Waste Generation

Identification of types, amounts and hazardous constituents of waste streams with the source and date of generation.

C. Periodic Waste Minimization Assessments

i. Identification of all points in a process where materials can be prevented from becoming a waste, or can be recycled.

ii. Identification of potential waste reduction and recycling techniques applicable to each waste, with a cost estimate for capital investment and implementation.

iii. Specify performance goals, preferably quantitative, for the source reduction of waste by stream. Whenever possible, goals should be stated as weight of waste generated per standard unit of production, as defined by the generator.

D. Cost Allocation System

i. Identification of waste management costs for each waste, factoring in liability, transportation, recordkeeping, personnel, pollution control, treatment, disposal, compliance and oversight to the extent feasible.

ii. Description of how departments are held accountable for the wastes they generate.

iii. Comparison of waste management costs with costs of potential reduction and recycling techniques applicable to each waste.

E. Technology Transfer

Description of efforts to seek and exchange technical information on waste minimization from other parts of the company, other firms, trade associations, technical assistance programs, and professional consultants.

F. Program Evaluation

i. Description of types and amounts of hazardous waste reduced or recycled.

ii. Analysis and quantification of progress made relative to each performance goal established and each reduction technique to be implemented.

iii. Amendments to waste minimization plan and explanation.

iv. Explanation and documentation of reduction efforts completed or in progress before development of the waste minimization plan.

v. Explanation and documentation regarding impediments to hazardous waste reduction specific to the individual facility.

VIII.C. RECORDKEEPING AND REPORTING

VIII.C.1. Annually, the Permittee shall submit a certification report of the types and quantities of waste generated, and the types and quantities of waste reduced/minimized. This certified report shall include a narrative study explaining the waste generated and minimization data, a description of goals and progress made in reducing/minimizing the generation of wastes, and a description of any impediment to the reduction and minimization of waste.

VIII.C.2. The Permittee shall maintain copies of this certification in the facility operating record as required by MHWMR 264.73.

MODULE IX - PHASE II RCRA ORGANIC AIR EMISSION REQUIREMENTS

IX.A. GENERAL INTRODUCTION

On December 6, 1994, EPA published the final rule for Phase II Organic Air Emissions Standards (40 CFR Parts 264 and 265, Subpart CC) for hazardous waste treatment, storage, and disposal facilities, including certain hazardous waste generators accumulating waste on-site in RCRA permit-exempt (90-day) tanks and containers. In general, under these standards air emissions controls must be used for tanks, surface impoundments, containers and miscellaneous units which contact hazardous waste containing an average organic concentration greater than 500 ppmw at the point of origination determined by the procedures outlined in 40 CFR § 264.1083(a), except as specifically exempted under 40 CFR § 264.1080 and § 264.1082.

IX.B. ORGANIC AIR EMISSION STANDARDS

Prior to installing any tank, container, surface impoundment or miscellaneous unit subject to 40 CFR Part 264, Subpart CC, or modifying an existing process, waste handling or tank or container such that the unit(s) will become subject to 40 CFR Part 264 Subpart CC, the Permittee shall apply for a permit modification under § 270.42, and provide specific Part B application information required under 40 CFR §§ 270.14-17 and § 270.27, as applicable, with the modification request.

PERMIT ATTACHMENT A

PART A APPLICATION

OMB#: 2050-0034 Expires 11/30/2005

SEND COMPLETED FORM TO: The Appropriate State or EPA Regional Office.	United States Environmental Protection Agency **RCRA SUBTITLE C SITE IDENTIFICATION FORM**	

1. Reason for Submittal (See Instructions on page 14.)

MARK ALL BOX(ES) THAT APPLY

Reason for Submittal:

- ☐ To provide Initial Notification of Regulated Waste Activity (to obtain an EPA ID Number for hazardous waste, universal waste, or used oil activities)
- ☐ To provide Subsequent Notification of Regulated Waste Activity (to update site identification information)
- ☐ As a component of a First RCRA Hazardous Waste Part A Permit Application
- ☑ As a component of a Revised RCRA Hazardous Waste Part A Permit Application (Amendment # 4)
- ☐ As a component of the Hazardous Waste Report

2. Site EPA ID Number (page 15)

EPA ID Number: MSD007037278

3. Site Name (page 15)

Name: Grenada Manufacturing, LLC

4. Site Location Information (page 15)

Street Address: 635 Highway 332

City, Town, or Village: Grenada | State: Mississippi

County Name: Grenada | Zip Code: 38901

5. Site Land Type (page 15)

Site Land Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☐ State ☐ Other

6. North American Industry Classification System (NAICS) Code(s) for the Site (page 15)

A. NA | B.

C. | D.

7. Site Mailing Address (page 16)

Street or P. O. Box: Same as Item 4

City, Town, or Village:

State:

Country: | Zip Code:

8. Site Contact Person (page 16)

First Name: Don | MI: | Last Name: Williams

Phone Number: (662) 226-1161 Extension: 6113 | Email address: dwilliams@iceindustries.com

9. Operator and Legal Owner of the Site (pages 16 and 17)

A. Name of Site's Operator: Grenada Manufacturing, LLC | Date Became Operator (mm/dd/yyyy): 09/08/1999

Operator Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☐ State ☐ Other

B. Name of Site's Legal Owner: Grenada Manufacturing, LLC | Date Became Owner (mm/dd/yyyy): 09/08/1999

Owner Type: ☑ Private ☐ County ☐ District ☐ Federal ☐ Indian ☐ Municipal ☐ State ☐ Other

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9. Legal Owner (Continued) Address	Street or P. O. Box: 635 Highway 332	
	City, Town, or Village: Grenada	
	State: Mississippi	
	Country: Grenada	Zip Code: 38901

10. Type of Regulated Waste Activity
Mark "Yes" or "No" for all activities; complete any additional boxes as instructed. (See instructions on pages 18 to 21.)

A. Hazardous Waste Activities
Complete all parts for 1 through 6.

Y ☑ N ☐ **1. Generator of Hazardous Waste**
If "Yes", choose only one of the following - a, b, or c.

☐ a. LQG: Greater than 1,000 kg/mo (2,200 lbs./mo.) of non-acute hazardous waste; or

☐ b. SQG: 100 to 1,000 kg/mo (220 - 2,200 lbs./mo.) of non-acute hazardous waste; or

☑ c. CESQG: Less than 100 kg/mo (220 lbs./mo.) of non-acute hazardous waste

In addition, indicate other generator activities.

Y ☐ N ☑ d. United States Importer of Hazardous Waste

Y ☐ N ☑ e. Mixed Waste (hazardous and radioactive) Generator

Y ☐ N ☑ **2. Transporter of Hazardous Waste**

Y ☑ N ☐ **3. Treater, Storer, or Disposer of Hazardous Waste (at your site)** Note: A hazardous waste permit is required for this activity.

Y ☐ N ☑ **4. Recycler of Hazardous Waste (at your site)**

Y ☐ N ☑ **5. Exempt Boiler and/or Industrial Furnace**
If "Yes", mark each that applies.
☐ a. Small Quantity On-site Burner Exemption
☐ b. Smelting, Melting, and Refining Furnace Exemption

Y ☐ N ☑ **6. Underground Injection Control**

B. Universal Waste Activities

Y ☐ N ☑ **1. Large Quantity Handler of Universal Waste (accumulate 5,000 kg or more) [refer to your State regulations to determine what is regulated]. Indicate types of universal waste generated and/or accumulated at your site. If "Yes", mark all boxes that apply:**

	Generate	Accumulate
a. Batteries	☐	☐
b. Pesticides	☐	☐
c. Thermostats	☐	☐
d. Lamps	☐	☐
e. Other (specify) _____	☐	☐
f. Other (specify) _____	☐	☐
g. Other (specify) _____	☐	☐

Y ☐ N ☑ **2. Destination Facility for Universal Waste**
Note: A hazardous waste permit may be required for this activity.

C. Used Oil Activities
Mark all boxes that apply.

Y ☐ N ☑ **1. Used Oil Transporter**
If "Yes", mark each that applies.
☐ a. Transporter
☐ b. Transfer Facility

Y ☐ N ☑ **2. Used Oil Processor and/or Re-refiner**
If "Yes", mark each that applies.
☐ a. Processor
☐ b. Re-refiner

Y ☐ N ☑ **3. Off-Specification Used Oil Burner**

Y ☐ N ☑ **4. Used Oil Fuel Marketer**
If "Yes", mark each that applies.
☐ a. Marketer Who Directs Shipment of Off-Specification Used Oil to Off-Specification Used Oil Burner
☐ b. Marketer Who First Claims the Used Oil Meets the Specifications

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11. Description of Hazardous Wastes (See Instructions on page 22.)

A. Waste Codes for Federally Regulated Hazardous Wastes. Please list the waste codes of the Federal hazardous wastes handled at your site. List them in the order they are presented in the regulations (e.g., D001, D003, F007, U112). Use an additional page if more spaces are needed.

D001	D040	F002	U220			

B. Waste Codes for State-Regulated (i.e., non-Federal) Hazardous Wastes. Please list the waste codes of the State-regulated hazardous wastes handled at your site. List them in the order they are presented in the regulations. Use an additional page if more spaces are needed for waste codes.

12. Comments (See Instructions on page 22.)

1. RCRA Part B Permit Renewal

11. Waste is from purging monitoring wells around closed surface impoundment.

13. Certification. I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.
For the RCRA Hazardous Waste Part A Permit Application, all operator(s) and owner(s) must sign (see 40 CFR 270.10 (b) and 270.11).
(See Instructions on page 22.)

Signature of operator, owner, or an authorized representative	Name and Official Title (type or print)	Date Signed (mm/dd/yyyy)
S/ Signature	B.T. Anderson V.M	05-27-2008

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United States Environmental Protection Agency

HAZARDOUS WASTE PERMIT INFORMATION FORM

1. Facility Permit Contact (See instructions on page 23)	First Name: Don	MI:	Last Name: Williams
	Phone Number: (662) 226-1161		Phone Number Extension: 6,113
2. Facility Permit Contact Mailing Address (See instructions on page 23)	Street or P.O. Box: 635 Highway 332		
	City, Town, or Village: Grenada		
	State: Mississippi		
	Country: Grenada		Zip Code: 38901
3. Operator Mailing Address and Telephone Number (See instructions on page 23)	Street or P.O. Box: Same as Item 2		
	City, Town, or Village:		
	State:		
	Country:	Zip Code:	Phone Number
4. Legal Owner Mailing Address and Telephone Number (See instructions on page 23)	Street or P.O. Box: Same as Item 2		
	City, Town, or Village:		
	State:		
	Country:	Zip Code:	Phone Number
5. Facility Existence Date (See instructions on page 24)	Facility Existence Date (mm/dd/yyyy): 07/10/1961		

6. Other Environmental Permits (See instructions on page 24)

A. Permit Type (Enter code)	B. Permit Number	C. Description
N	MS0000067111	NPDES Permit

7. Nature of Business (Provide a brief description; see instructions on page 24)

Post Closure Care of Permitted Surface Impoundment

8. Process Codes and Design Capacities (See instructions on page 24) - Enter information in the Sections on Form Page 3.

A. PROCESS CODE - *Enter the code from the list of process codes in the table below that best describes each process to be used at the facility. Fifteen lines are provided for entering codes. If more lines are needed, attach a separate sheet of paper with the additional information. For "other" processes (i.e., D99, S99, T04 and X99), enter the process information in item 9 (including a description).*

B. PROCESS DESIGN CAPACITY - *For each code entered in Section A, enter the capacity of the process.*

1. **AMOUNT** - *Enter the amount. In a case where design capacity is not applicable (such as in a closure/post-closure or enforcement action) enter the total amount of waste for that process.*
2. **UNIT OF MEASURE** - *For each amount entered in Section B(1), enter the code in Section B(2) from the list of unit of measure codes below that describes the unit of measure used. Select only from the units of measure in this list.*

C. PROCESS TOTAL NUMBER OF UNITS - *Enter the total number of units for each corresponding process code.*

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Disposal:	
D79	Underground Injection Well Disposal	Gallons; Liters; Gallons Per Day; or Liters Per Day
D80	Landfill	Acre-feet; Hectare-meter; Acres; Cubic Meters; Hectares; Cubic Yards
D81	Land Treatment	Acres or Hectares
D82	Ocean Disposal	Gallons Per Day or Liters Per Day
D83	Surface Impoundment Disposal	Gallons; Liters; Cubic Meters; or Cubic Yards
D99	Other Disposal	Any Unit of Measure in Code Table Below
	Storage:	
S01	Container	Gallons; Liters; Cubic Meters; or Cubic Yards
S02	Tank Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S03	Waste Pile	Cubic Yards or Cubic Meters
S04	Surface Impoundment Storage	Gallons; Liters; Cubic Meters; or Cubic Yards
S05	Drip Pad	Gallons; Liters; Acres; Cubic Meters; Hectares; or Cubic Yards
S06	Containment Building Storage	Cubic Yards or Cubic Meters
S99	Other Storage	Any Unit of Measure in Code Table Below
	Treatment:	
T01	Tank Treatment	Gallons Per Day; Liters Per Day
T02	Surface Impoundment Treatment	Gallons Per Day; Liters Per Day
T03	Incinerator	Short Tons Per Hour; Metric Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
T04	Other Treatment	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Gallons Per Day; Liters Per Hour; or Million Btu Per Hour
T80	Boiler	Gallons; Liters; Gallons Per Hour; Liters Per Hour; Btu Per Hour; or Million Btu Per Hour

PROCESS CODE	PROCESS	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
	Treatment (continued):	
T81	Cement Kiln	For T81-T93:
T82	Lime Kiln	
T83	Aggregate Kiln	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; Liters Per Hour; Kilograms Per Hour; or Million Btu Per Hour
T84	Phosphate Kiln	
T85	Coke Oven	
T86	Blast Furnace	
T87	Smelting, Melting, or Refining Furnace	
T88	Titanium Dioxide Chloride Oxidation Reactor	
T89	Methane Reforming Furnace	
T90	Pulping Liquor Recovery Furnace	
T91	Combustion Device Used In The Recovery Of Sulfur Values From Spent Sulfuric Acid	
T92	Halogen Acid Furnaces	
T93	Other Industrial Furnaces Listed in 40 CFR §260.10	
T94	Containment Building - Treatment	Cubic Yards; Cubic Meters; Short Tons Per Hour; Gallons Per Hour; Liters Per Hour; Btu Per Hour; Pounds Per Hour; Short Tons Per Day; Kilograms Per Hour; Metric Tons Per Day; Gallons Per Day; Liters Per Day; Metric Tons Per Hour; or Million Btu Per Hour
	Miscellaneous (Subpart X):	
X01	Open Burning/Open Detonation	Any Unit of Measure in Code Table Below
X02	Mechanical Processing	Short Tons Per Hour; Metric Tons Per Hour; Short Tons Per Day; Metric Tons Per Day; Pounds Per Hour; Kilograms Per Hour; Gallons Per Hour; Liters Per Hour; or Gallons Per Day
X03	Thermal Unit	Gallons Per Day; Liters Per Day; Pounds Per Hour; Short Tons Per Hour; Kilograms Per Hour; Metric Tons Per Day; Metric Tons Per Hour; Short Tons Per Day; Btu Per Hour; or Million Btu Per Hour
X04	Geologic Repository	Cubic Yards; Cubic Meters; Acre-feet; Hectare-meter; Gallons; or Liters
X99	Other Subpart X	Any Unit of Measure Listed Below

UNIT OF MEASURE	UNIT OF MEASURE CODE
Gallons	G
Gallons Per Hour	E
Gallons Per Day	U
Liters	L
Liters Per Hour	H
Liters Per Day	V

UNIT OF MEASURE	UNIT OF MEASURE CODE
Short Tons Per Hour	D
Metric Tons Per Hour	W
Short Tons Per Day	N
Metric Tons Per Day	S
Pounds Per Hour	J
Kilograms Per Hour	R
Million Btu Per Hour	X

UNIT OF MEASURE	UNIT OF MEASURE CODE
Cubic Yards	Y
Cubic Meters	C
Acres	B
Acre-feet	A
Hectares	Q
Hectare-meter	F
Btu Per Hour	I

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8. Process Codes and Design Capacities (Continued)

EXAMPLE FOR COMPLETING Item 8 (shown in line number X-1 below): A facility has a storage tank, which can hold 533.788 gallons.

Line Number	A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. (2) Unit of Measure (Enter code)	C. Process Total Number of Units	For Official Use Only
X 1	S 0 2	533.788	G	001	
1	D 8 3	7500.	Y	001	
2		.			
3		.			
4		.			
5		.			
6		.			
7		.			
8		.			
9		.			
10		.			
11		.			
12		.			
13		.			
14		.			
15		.			

NOTE: If you need to list more than 15 process codes, attach an additional sheet(s) with the information in the same format as above. Number the lines sequentially, taking into account any lines that will be used for "other" processes (i.e., D99, S99, T04 and X99) in Item 9.

9. Other Processes (*See instructions on page 25 and follow instructions from Item 8 for D99, S99, T04 and X99 process codes*)

Line Number (Enter #s in sequence with Item 8)	A. Process Code (From list above)	B. PROCESS DESIGN CAPACITY (1) Amount (Specify)	B. (2) Unit of Measure (Enter code)	C. Process Total Number of Units	D. Description of Process
X 2	T 0 4	100.000	U	001	In-situ Vitrification
		.			
		.			
		.			
		.			
		.			

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10. Description of Hazardous Wastes (See instructions on page 25) - Enter information in the Sections on Form Page 5.

A. EPA HAZARDOUS WASTE NUMBER - *Enter the four-digit number from 40 CFR, Part 261 Subpart D of each listed hazardous waste you will handle. For hazardous wastes which are not listed in 40 CFR, Part 261 Subpart D, enter the four-digit number(s) from 40 CFR Part 261, Subpart C that describes the characteristics and/or the toxic contaminants of those hazardous wastes.*

B. ESTIMATED ANNUAL QUANTITY - *For each listed waste entered in Section A, estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in Section A, estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.*

C. UNIT OF MEASURE - *For each quantity entered in Section B, enter the unit of measure code. Units of measure which must be used and the appropriate codes are:*

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure, taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed hazardous waste: For each listed hazardous waste entered in Section A, select the code(s) from the list of process codes contained in Items 8A and 9A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the listed hazardous wastes.

For non-listed hazardous waste: For each characteristic or toxic contaminant entered in Section A, select the code(s) from the list of process codes contained in Items 8A and 9A on page 3 to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed hazardous wastes that possess that characteristic or toxic contaminant.

NOTE: THREE SPACES ARE PROVIDED FOR ENTERING PROCESS CODES. IF MORE ARE NEEDED:

1. *Enter the first two as described above.*
2. *Enter "000" in the extreme right box of Item 10.D(1).*
3. *Use additional sheet, enter line number from previous sheet, and enter additional code(s) in Item 10.E.*

2. PROCESS DESCRIPTION: *If a code is not listed for a process that will be used, describe the process in Item 10.D(2) or in Item 10.E(2).*

NOTE: HAZARDOUS WASTES DESCRIBED BY MORE THAN ONE EPA HAZARDOUS WASTE NUMBER - Hazardous wastes that can be described by more than one EPA Hazardous Waste Number shall be described on the form as follows:

1. *Select one of the EPA Hazardous Waste Numbers and enter it in Section A. On the same line complete Sections B, C and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.*
2. *In Section A of the next line enter the other EPA Hazardous Waste Number that can be used to describe the waste. In Section D(2) on that line enter "included with above" and make no other entries on that line.*
3. *Repeat step 2 for each EPA Hazardous Waste Number that can be used to describe the hazardous waste.*

EXAMPLE FOR COMPLETING Item 10 (shown in line numbers X-1, X-2, X-3, and X-4 below) - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operations. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

Line Number		A. EPA Hazardous Waste No. (Enter code)				B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)						(2) PROCESS DESCRIPTION (If a code is not entered in D(1))
X	1	K	0	5	4	900	P	T	0	3	D	8	0	
X	2	D	0	0	2	400	P	T	0	3	D	8	0	
X	3	D	0	0	1	100	P	T	0	3	D	8	0	
X	4	D	0	0	2									Included With Above

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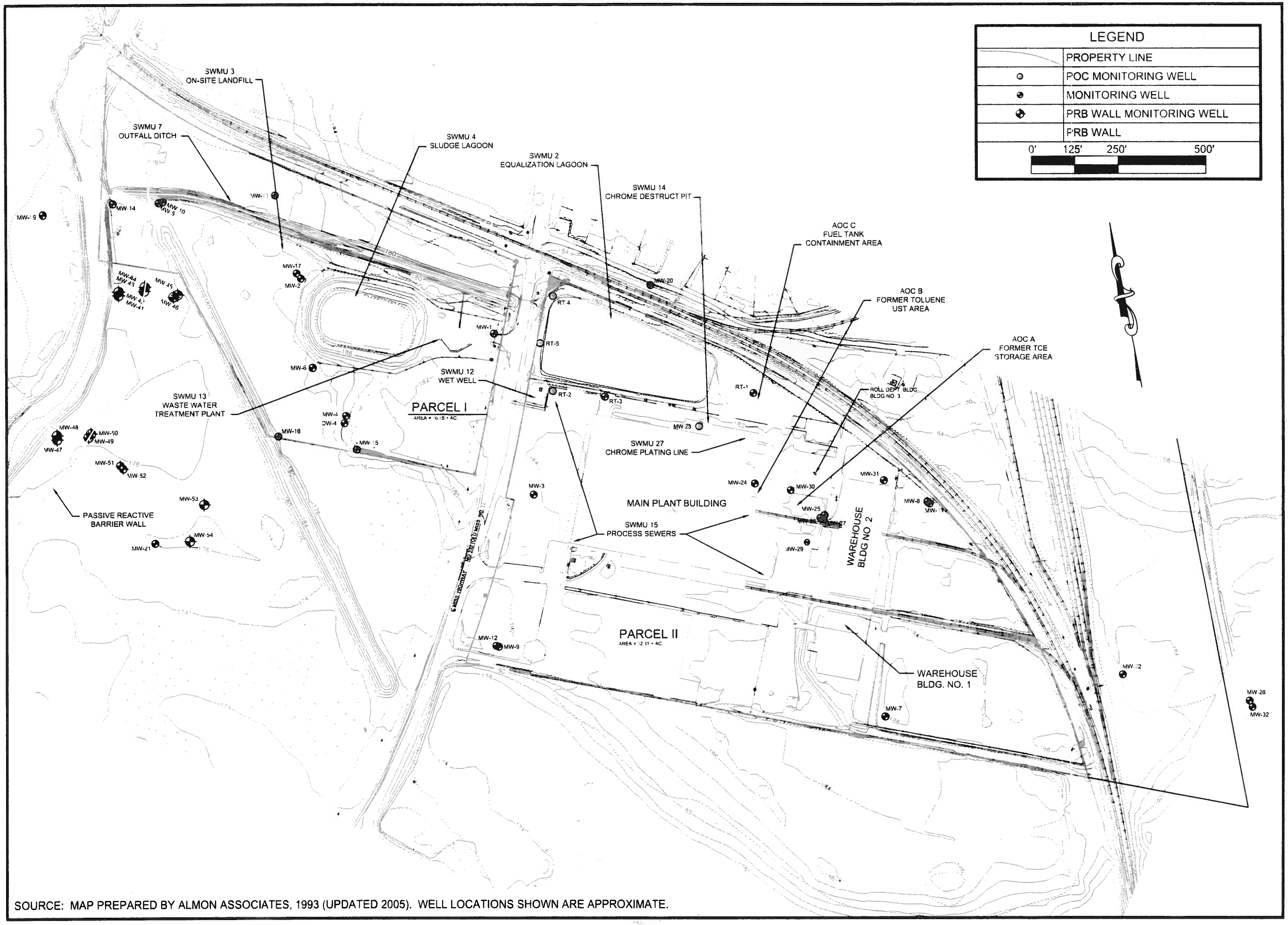
10. Description of Hazardous Wastes (Continued. Use the Additional Sheet(s) as necessary; number pages as 5 a, etc.)

Line Number		A. EPA Hazardous Waste No. (Enter code)	B. Estimated Annual Quantity of Waste	C. Unit of Measure (Enter code)	D. PROCESSES (1) PROCESS CODES (Enter code)	D. PROCESSES (2) PROCESS DESCRIPTION (If a code is not entered in D(1))
	1	D001	110	G	S01	Purge Water from Monitoring Wells
	2	D040				Included with above
	3	F002				Included with above
	4	U220				Included with above
	5					
	6					
	7					
	8					
	9					
1	0					
1	1					
1	2					
1	3					
1	4					
1	5					
1	6					
1	7					
1	8					
1	9					
2	0					
2	1					
2	2					
2	3					
2	4					
2	5					
2	6					
2	7					
2	8					
2	9					
3	0					
3	1					
3	2					
3	3					
3	4					
3	5					
3	6					
3	7					
3	8					
3	9					

11. Map (See instructions on pages 25 and 26)
Attach to this application a topographic map, or other equivalent map, of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in this map area. See instructions for precise requirements.
12. Facility Drawing (See instructions on page 26)
All existing facilities must include a scale drawing of the facility (see instructions for more detail).
13. Photographs (See instructions on page 26)
All existing facilities must include photographs (aerial or ground-level) that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas (see instructions for more detail).
14. Comments (See instructions on page 26)



SOURCE: MAP PREPARED BY ALMON ASSOCIATES, 1993 (UPDATED 2005). WELL LOCATIONS SHOWN ARE APPROXIMATE.

REVISIONS			
NO.	DESCRIPTION	DATE	BY

DESIGNED BY:
DRAWN BY: BJW
CHECKED BY:
APPROVED BY:

ENSR CORPORATION
COLUMBIA, SOUTH CAROLINA 29210
PHONE: (803) 216-0003
FAX: (803) 216-0708
WEB: HTTP://WWW.ENSR.AECOM.COM

SITE PLAN

GRENADA MANUFACTURING, LLC PLANT
GRENADA, MISSISSIPPI

SCALE:	DATE:	PROJECT NUMBER:
1" = 250'	5/20/08	06630-257

FIGURE NUMBER:
2
DRAWING NUMB

PERMIT ATTACHMENT B

POST CLOSURE CARE PLAN

POST-CLOSURE INSPECTION PLAN

Quarterly inspections of the closed Equalization lagoon will be conducted by Grenada Manufacturing LLC or a qualified contractor for the duration of the post-closure care period. Repair of damaged areas may be conducted by Grenada Manufacturing LLC or a qualified contractor. A written inspection log will be maintained by Grenada Manufacturing LLC. This inpsection log will record the inspector's name, inspection date, time, site conditions, problems, any suggested and implemented corrective action. This section details the specific areas the quarterly inspections will address, while Table 1 summarizes the inspection areas and specific items.

SECURITY CONTROL DEVICES

The closed Equalization Lagoon and plant area is surrounded by chain-link security fencing combined with buildings and/or structures that prevent casual access. The entrance gate into the facility is closed at all times with access controlled by an automatic gate activated within the plant building. During non-daylight hours, the access gate is locked and access can only be obtained by having Grenada Manufacturing LLC plant personnel unlock the gate. The fence perimeter will be inspected for signs of deterioration and vandalism. Any potential access points will be inspected and repaired, if appropriate, to ensure that security is maintained.

EROSION DAMAGE

The closed Equalization Lagoon will be carefully inspected for erosion problems including the composite cap, soil embankment, drainage diversion ditches, run-on control berms, and surrounding revegetated surfaces. The topsoil layer and vegetative cover over the Equalization Lagoon will be inspected for signs of erosion. The drainage ditches and run-on control berms will also be inspected

for erosion damage and debris that could potentially influence the free drainage of surface water. Repair of damaged areas may consist of any combination of earthwork, fertilization, revegetation, and/or removal of erosion debris to restore the affected areas to their proper condition.

COVER SETTLEMENT, SUBSIDENCE, AND DISPLACEMENT

The Equalization Lagoon stabilized waste cell, composite cap, and soil embankment will be inspected for signs of settlement, subsidence, and displacement. Such signs of distress will be noted and a plan for mitigation and restoration developed and implemented under the supervision of a Registered Professional Engineer. Any ponding, cracks, collapse, signs of infiltration or exposure of cell contents will be repaired by a qualified contractor to maintain the cell integrity and will be subject to acceptance by the Engineer.

VEGETATIVE COVER CONDITION

The vegetative cover over the entire area of the closed Equalization Lagoon will be reviewed as part of each inspection. The growth and coverage of the vegetation will be evaluated to ensure that adequate evapotranspiration and erosion control is provided at all times. Bare areas will be revegetated as they appear to provide adequate protection against continued erosion and infiltration. The vegetated areas will be fertilized as necessary to maintain sufficient growth. The vegetative cover will be routinely mowed by Grenada Manufacturing LLC. Grenada Manufacturing LLC may consult qualified contractors and/or the local Soil Conservation Office for assistance in selection of additional or replacement vegetation.

As part of the inspection program, no trees planted on the cap or anywhere within the limits of the drainage ditch. This will limit potential damage associated with root penetration.

DRAINAGE SYSTEM

The drainage ditches and run-on control berms will be inspected to ensure that proper site drainage is maintained and that proper run-off occurs from the area surrounding the Equalization Lagoon. Run-on control berms will be checked to keep run-off from areas outside the closed Equalization Lagoon from entering the lagoon. Any areas of ponding or erosion will be corrected by a qualified contractor. Routine maintenace of the drainage control network will be conducted to prevent standing water or excessive erosion, and to ensure that erosion or scour is effectively controlled.

BENCHMARK INTEGRITY

Benchmarks that may be used in the future surveys of the closed Equalization Lagoon will be checked for proper labeling, shifting, accessibility or other factors that would prohibit relocation of the benchmark. If benchmark damage occurs, the site closure surveyor should be notified to ensure validity of future surveys.

LEACHATE MANAGEMENT AND GAS VENTING

Based on the physical and chemical properties of the stabilized waste contained in the Equalization Lagoon containment cell, leachate management and gas venting are not issues requiring action.

INSPECTION SUMMARY
EQUALIZATION LAGOON CLOSURE INSPECTION SUMMARY

TEXTRON AUTOMOTIVE COMPANY
GRENADA, MISSISSIPPI

Date: **Inspected By:**

1. Perimeter Fence

	Yes	No
Breach in Fence	☐	☐

If yes, response actions taken:

_____

_____

2. Cap, Cell Berm, Control Berms

	Yes	No
Erosion Damage	☐	☐
Ponding of Surface Water	☐	☐
Deformation	☐	☐
Bare Spots	☐	☐
Loss of Integrity/Stability	☐	☐

If yes, response actions taken:

_____

_____

3. Drainage Ditches

	Yes	No
Erosion Damage	☐	☐
Ponding	☐	☐
Bare Spots	☐	☐
Debris	☐	☐

If yes, response actions taken:

_____

_____

4. Groundwater Monitoring Wells & Surveying Benchmarks

	Yes	No
Damaged/Missing Cap or Lock	☐	☐
Damaged Casing or Apron	☐	☐
Illegible Well Label	☐	☐
Plugged Well Screen	☐	☐
Damaged Pump or Bailer	☐	☐
Damaged, Moved, Covered or Unmarked Benchmark	☐	☐

If yes, response actions taken:

_____

_____

PERMIT ATTACHMENT C

GROUNDWATER SAMPLING AND ANALYSIS PLAN

Quality Assurance Project Plan (QAPP) Corrective Measures Sampling, Equalization Lagoon Post-Closure Monitoring, and Corrective Measures Investigation Sampling

prepared for

ArvinMeritor, Inc.

June 2006

QUALITY ASSURANCE PROJECT PLAN (QAPP)
CORRECTIVE MEASURES SAMPLING,
EQUALIZATION LAGOON POST-CLOSURE MONITORING,
AND CORRECTIVE MEASURES INVESTIGATION SAMPLING

Prepared for:

ArvinMeritor Inc.
Troy, Michigan

Prepared by:

Brown and Caldwell
501 Great Circle Road, Suite 150
Nashville, Tennessee 37228
(615) 255-2288
Fax (615) 256-8332

November 2000
Updated June 2006

129874.009

501 Great Circle Road
Suite 150
Nashville, TN 37228

Tel: (615) 255-2288
Fax: (615) 256-8332

June 6, 2006

27-129874.009

BROWN AND CALDWELL

Mr. Donald Webster
USEPA Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

RE: Revised Quality Assurance Project Plan (QAPP) for the
Corrective Measures Sampling, Equalization Lagoon
Post-Closure Monitoring, and Corrective Measures Sampling
Grenada Stamping and Assembly Site, Grenada, Mississippi

Dear Mr. Webster:

On behalf of ArvinMeritor, Inc., Brown and Caldwell is submitting one copy of the revised QAPP for the referenced site. This represents the first revision to the original QAPP approved in 2000. The major revisions to the QAPP include the transfer of select monitoring responsibilities from Textron to ArvinMeritor and the addition of potential investigation procedures related to additional corrective measures.

A copy of this QAPP has also been sent to Mr. Toby Cook at the Mississippi Department of Environmental Quality. If you should have any questions, please feel free to call me at (615) 250-1241 or contact me by e-mail at dshowers@brwncald.com.

Sincerely,

BROWN AND CALDWELL

Dale R. Showers, P.E.
Engineering Manager
Environmental Services

cc: Toby Cook, MDEQ
John Bozick, Meritor Automotive
Don Williams, Grenada Manufacturing

\\BCNSH02\Projects\Clients\ArvinMeritor\129874 - ArvinMeritor CY2006 Monitoring\009 - QAPP\L060606EPA.doc

1.0 Title and Approval Page

Document Title: Quality Assurance Project Plan for the Corrective Measures Sampling, Equalization Lagoon Post-Closure Monitoring, and Corrective Measures Investigation Sampling

Lead Organization: ArvinMeritor Inc., Troy, Michigan

Preparer's Name and Organizational Affiliation: Amy R. Huskey, Brown and Caldwell

Preparer's Address and Telephone Number: 501 Great Circle Road
Suite 150
Nashville, TN 37228
615-255-2288

Preparation Date: November 2000, Updated June 2006

Lead Organization Project Manager:

John F. Bozick, ArvinMeritor, Inc. — 6-1-06
Printed Name/Organization — Signature/Date

Investigative Organization's Project Manager:

Dale R. Showers, Brown and Caldwell — 6-1-06
Printed Name/Organization — Signature/Date

Quality Assurance Officers:

Gregory L. Christians, P.G. Brown and Caldwell — 6/06/06
Printed Name/Organization — Signature/Date

2.0 Table of Contents and Document Format

2.1 Table of Contents

2.2 List of Tables

2.3 List of Figures

3.0 Distribution List and Project Personnel Sign-off Sheet

The following is the distribution list for the QAPP.

Don Webster
USEPA Region 4
Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303-8960

John Bozick
Environmental Engineer
ArvinMeritor, Inc.
2135 West Maple Road
Troy, MI 48084

Don Williams
Plant EHS Coordinator
Grenada Stamping and Assembly
635 Highway 332
Grenada, MS 38901

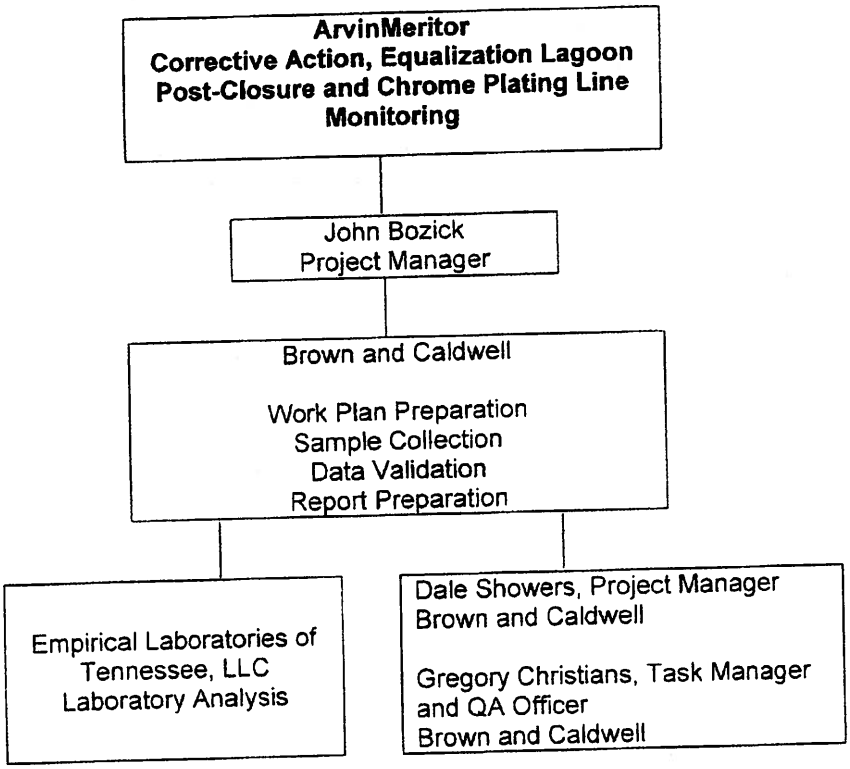
Dale Showers
Project Manager
Brown and Caldwell
501 Great Circle Road
Suite 150
Nashville, TN 37228

Toby Cook
Environmental Engineer
Office of Pollution Control
Mississippi Department of Environmental Quality
2380 Highway 80 West
Jackson, MS 39204

4.0 Project Organization

The organizations and key individuals involved in the Corrective Action, Equalization Lagoon post-closure and Chrome Plating Line Area monitoring, are set forth in the organizational chart below.

Figure 4-1. Organizational Chart for Corrective Action, Equalization Lagoon Post-Closure and Chrome Plating Line Area Monitoring



Laboratories:

The laboratories listed below have been selected for these monitoring activities. Laboratories will be subcontracted by Brown and Caldwell to provide analytical services.

Corrective Action, Equalization Lagoon Post-Closure and Chrome Plating Line Area Monitoring (Brown and Caldwell)

Empirical Laboratories of Tennessee, LLC.
Rick Davis – Laboratory Director
Rick Davis – Laboratory Quality Assurance Officer

Responsibilities:

ArvinMeritor

ArvinMeritor, as the primary party, has complete oversight of the project RCRA Corrective Action activities, Equalization Lagoon Post-Closure and Chrome Line Plating Area monitoring for the Site.

Mr. John Bozick is the Project Manager. Mr. Bozick's duties are to ensure the overall satisfactory completion of the project including the closure activities. Mr. Bozick has complete authority over all actions taken at the Site, including:

- Managing the development of the Corrective Action Work Plan.
- Managing the development of the Equalization Lagoon Post-Closure and Chrome Plating Line Area monitoring.
- Contracting and management oversight of Work Plan Design, Reporting, Data Validation and Field Investigation activities.
- Obtaining approvals from local, state, and federal authorities for all phases of work.
- Communicating with local, state, and federal authorities on all matters relating to the project.
- Presenting the final report to authorities.

Brown and Caldwell (BC)

Brown and Caldwell's responsibilities for the RCRA Corrective Action activities, the Equalization Lagoon Post-Closure and Chrome Line Plating Area monitoring activities for the Site and include:

- Prepare draft, final draft, and final work plans.
- Secure analytical laboratories.
- Perform sample collection activities.
- Perform sample data validation.
- Prepare draft, final draft, and final reports.

5.0 Background Problem Definition

This project is to (1) continue site groundwater, surface water, and sediment sampling as part of the Site Corrective Measures, (2) continue the RCRA Equalization Lagoon Post-Closure monitoring, (3) continue monitoring for the Chrome Plating Line Area at the Grenada Manufacturing Site, (4) continue indoor air monitoring, inside the main Plant building, and (5) provide supplemental data for the evaluation and implementation of the RCRA Corrective Action.

5.1 Description of Current Site Status

5.1.1 Site Investigation and RCRA Corrective Action

The Automotive Division of Rockwell International Corporation operated a wheel cover manufacturing facility in Grenada, Mississippi from 1966 to 1985 before selling the operations and property to Textron Automotive Company (Textron), formerly Randall Textron, who then sold the operations and property to Grenada Manufacturing, LLC (Grenada Mfg.) in 1999. Grenada Mfg. (Permittee), now Grenada Stamping and Assembly, continues to operate the plant. ArvinMeritor OE, LLC ("ArvinMeritor") is a successor to the Automotive Division of Rockwell International Corporation ("Rockwell"). ArvinMeritor succeeded to the rights and obligations of Rockwell as the result of a corporate restructuring in 1997 and a merger in 2000. The most extensive investigative work is reported in the 1994 Remedial Investigation (RI) Report conducted by ECKENFELDER INC., now known as Brown and Caldwell (BC). The work was in response to a Mississippi Department of Environmental Quality (MDEQ) Administrative Order of Consent designed to investigate the on-Site landfill, and was subsequently expanded to include other areas of the Site.

The RI conducted by ECKENFELDER INC. in January 1994 identified the presence of trichloroethylene (TCE) and its degradation products, as well as toluene and chromium in the soil and groundwater at the Site. A Baseline Risk Assessment (BRA) was performed for soil and upper-site groundwater as part of the Supplemental RI Report prepared by ECKENFELDER INC. in March 1994. The BRA provides an evaluation of the potential threat to human health and the environment of the constituents of interest at the Site. The risk assessment identifies the constituents of interest and, through the exposure and toxicity assessments, characterizes the associated potential risk, assuming no action is taken at the Site. The primary concern with respect to impacted groundwater is the migration of chlorinated ethenes and ethanes to Riverdale Creek. Toluene and chromium are also of concern, but are present at much lower concentrations than are the chlorinated volatile organic compounds (VOCs) and pose less risk to Riverdale Creek. The results of that investigation are discussed on a Site-wide basis in the RI Report. The solid waste management units (SWMUs) and areas of concern (AOCs) had not yet been determined at the time the report was submitted to the MDEQ.

Subsequent to the submittal of the RI Report, the facility became subject to regulation under RCRA Corrective Action and a RCRA Facility Assessment (RFA) was performed by USEPA's contractor (A.T. Kearney, Inc., 1997) as part of the Hazardous and Solid Waste Amendment

(HSWA) permit process for the facility in 1996 and 1997. As a result of the Preliminary Review (PR) and Visual Site Inspection (VSI), 26 SWMUs and 3 AOCs were identified.

On March 2, 1999, USEPA issued a combined RCRA Facility Investigation (RFI)/Confirmatory Sampling (CS) Work Plan call letter. ArvinMeritor and Textron requested a meeting at the Region IV office to review the results of the RI conducted for MDEQ and to identify potential data gaps. During a meeting held on May 13, 1999 among the USEPA Region IV Project Manager, and representatives from Textron Automotive, Arvin Automotive, and BC, it was agreed that nearly all of the information that might be generated in an RFI/CS effort already existed. USEPA requested that summaries of data obtained subsequent to issuance of the 1994 RI Report be prepared and that the available data be organized by SWMU or AOC. That document, the Summary of Investigative Work (SOIW), was prepared by BC in response to that request and was transmitted to USEPA and MDEQ in July 1999.

In November 2003, a baseline sampling event, consisting of groundwater, surface water, and sediment sampling, was performed in accordance with the Performance Monitoring Plan (PMP), Appendix E of the Design Basis Report for the Groundwater Interim Measure, prepared by BC in April 2003. The key purpose of the baseline sampling event was to provide pre-construction data to be used as points of comparison to monitor the effectiveness of the chosen interim measure permeable reactive barrier (PRB) at preventing off-site migration of impacted groundwater to surface water and sediment.

PRB construction activities started on August 31, 2004 and ended on March 29, 2005. Those activities included, but were not limited to, the trench excavation of a biopolymer wall, zero valent iron and sand backfill, and outfall ditch modifications. Outfall ditch modifications raised the invert to minimize groundwater migration to the surface water. Immediately following completion of the wall, four wells were installed inside the PRB to help monitor its performance.

A portion of the Site's groundwater is currently impacted by TCE and its degradation products. Additionally, there is a portion of the Site where chromium impacts groundwater. Groundwater at the Site appears to discharge primarily to Riverdale Creek. Potential impact to the creek appears to be limited to TCE and its degradation products.

5.1.2 Equalization Lagoon History/Background Information

Prior to its closure, the Equalization Lagoon measured approximately 525 feet long by 225 feet wide, with a depth of approximately 10 feet. The approximate capacity of the unit was 2,500,000 gallons. The Equalization Lagoon was constructed with seven influent pipes from the facility, and two effluent pipes in the basin. One effluent pipe discharged to the on-Site wastewater treatment system while the other effluent pipe served as the overflow outfall line.

The Equalization Lagoon was designed to handle a maximum flow of 500,000 gallons per day. Actual flow averaged approximately 360,000 gallons per day. The majority (70%) of this flow came from the Butler wash and buff operations. The remaining flow was comprised of wastewater from the roll department, boil-off, and chrome electroplating and boiler operations. The wastewater influent to the lagoon remained essentially unchanged until July 1990. At that

time the wastewaters from the chromium electroplating, roll department and boiler (about 20%) were routed directly to the wastewater treatment system.

In July 1991 all wastewaters were routed directly to the treatment system. The lagoon was dewatered by directing the remaining lagoon effluent to the treatment system. No wastewaters were discharged into the lagoon after July 1991. Storm water runoff that entered the lagoon was directed to treatment.

In May 1994 ***SECOR*** began lagoon closure activities according to the approved Modified Closure Plan by isolating and stabilizing the waste sludge and soils using quick lime, and enclosing the material in a lined, capped cell within the bounds of the former lagoon. The entire site was seeded and mulched to complete the closure construction activities on November 19, 1994. A Closure Report, dated December 9, 1994, documenting the closure activities was submitted to the State of Mississippi's Office of Pollution Control.

The localized geology surrounding the lagoon was evaluated when five monitoring wells were installed around the Equalization Lagoon during December 1991 and March 1992. Lithologic descriptions shown on the boring logs indicate that clayey or silty soils exist from the ground surface to a varying depth between 5 and 6 feet below surface grade (BSG). Underlying the silt and clay layers is medium grained sand. This sand extends to a depth of at least 20 feet BSG (the extent of the borings). The boring logs indicate that the sand was the uppermost water bearing unit.

The depth to groundwater was encountered in the borings between 10 and 16 feet BSG. Groundwater level measurements have been conducted periodically since installation of the existing shallow groundwater monitoring wells (MWRT-1, MWRT-2, MWRT-3, MWRT-4, and MWRT-5). Based on interpretation of these measurements, groundwater flows toward the northwest.

Given this information the existing groundwater monitoring wells were identified in relation to their position upgradient or downgradient of the lagoon.

Well Identification	Gradient and Direction from the Lagoon
MWRT-1	Up and East
MWRT-2	Cross and South
MWRT-3	Cross and South
MWRT-4	Down and Northwest
MWRT-5	Down and West

These wells were sampled and analyzed monthly for comparison to quality objectives for VOCs, indicator parameters and metals. Levels of chromium in the groundwater collected from monitoring wells located west of the former Equalization Lagoon were shown to exceed the USEPA maximum contaminate level (MCL) for chromium (0.1 mg/L), while levels of chromium in the groundwater collected from the wells northwest and east of the lagoon were shown to be below the USEPA MCL for chromium. All groundwater samples collected from both upgradient and downgradient monitoring wells had levels of TCE exceeding the USEPA MCL for TCE (0.005 mg/L). The highest levels of TCE were detected in the wells at the west side of the

lagoon. Monitoring well MWRT-1 located upgradient and east demonstrated the lowest TCE levels.

A summary of data collected from 1992 to 1994 from the sludge and subsoils in the lagoon, as well as water quality from the monitoring wells in the vicinity of the lagoon, are provided in Tables 5-1 and 5-2.

5.1.3 Chrome Plating Operation Background Information

The following background information was cited from the *Closure Report for the Chrome Plating Line Area*, Global Environmental Solutions, Inc. (GESI), Project No. 98537.01, August 4, 2003.

The Chrome Plating Line Area consisted of three separate pits, installed between 1961 and 1964, originally containing chrome plating equipment. This equipment consisted of steel and composite tanks set into containment pits with each tank performing a separate function within the chrome plating process. Typical operations included cleaning, etching, and plating. Each containment pit was approximately 17 feet by 100 feet and four feet deep. In the early 1990s, an internal dike was installed separating the non-chrome from the chrome process equipment. In addition, there was concrete dunnage located along the bottom of the pits that was used to support the plating line tanks and associated equipment. Rinse water from the chrome plating lines originally drained to the Chromium Destruct Pit. The hexavalent chrome was reduced to trivalent chrome in the Chromium Destruct Pit before being transferred to the Equalization Lagoon. In the early 1990s, after closure of the Equalization Lagoon, treated water from the Destruct Pit was diverted from the Equalization Lagoon and discharged through the wastewater treatment plant. After July 1993, discharge from the Destruct Pit to the lagoon and wastewater treatment system was halted and the chromium was recovered from the rinse water. The Destruct Pit was then used to collect rinse water from the chromium plating lines, prior to recovery in the on-site recovery system, for subsequent reuse in the plating lines (GESI, 2003).

On March 27, 2002, GESI submitted the final closure report for the clean closure of the Chromium Destruct Pit (SWMU 14). During the Chromium Destruct Pit closure activities, soil samples were collected from six boring locations in the area of the former Chromium Plating Lines. Three of the borings had soil samples that were in excess of the Region 9 Preliminary Remediation Guidelines (Region 9 PRGs) for hexavalent chromium. As a result of these analytical results, the Chrome Plating Line Area was identified as an additional Solid Waste Management Unit (SWMU 27) and the facility notified the USEPA Region 4 by letter on March 26, 2002 of the existence of the new SWMU. In addition, as required in the Permit, the facility submitted an Assessment Report and Closure Plan for the Chrome Plating Line Area dated January 23, 2003. Assessment of this area was completed as part of closure of the Chromium Destruct Pit. USEPA granted clean closure approval of the Chromium Destruct Pit in a letter to the facility dated April 4, 2002. Due to elevated levels of chlorinated and volatile organics in the soil and groundwater, USEPA concluded that it would not be wise to excavate for chromium in soil within the Main Plant building. Instead, a closure with waste in place of SWMU 27 was approved by the USEPA in a letter to the facility dated February 3, 2003 (GESI, 2003).

Table 5-1 1992 – 1994 Data Summary – Organic Concentration Ranges

Chemical	Sludge (ppm)	Subsoil (ppm)	Monitoring Well RT-1 (µg/L)	Monitoring Well RT-2 (µg/L)	Monitoring Well RT-5 (µg/L)	Monitoring Well RT-4 (µg/L)
Benzene	ND	ND	<5.0	<5000	<250	<250
1,1-Dichloroethane	ND	ND	<5.0	<5000	<250	<250
t-1,2-Dichloroethene	DNA	DNA	<5.0-5.8	2600-5700	<50-5200	3000-5400
c-1,2-Dichloroethene	DNA	DNA	<5.0	<5000	<5000	<250
Ethylbenzene	0.40-0.98	ND	<5.0	<5000	<5000	<250
Methylene Chloride	0.29-1.4	0.006-3.4	<5.0	<5000	<5000	<250
Tetrachloroethene	ND	ND	<5.0	<5000	<5000	<250
1,1,2-Trichloroethane	ND	ND	<5.0	<5000	<5000	<250
Trichloroethene	0.87-9,500	ND-82	87-170	53000-13000	290-860	4900-9400
Toluene	0.81-110	ND-1.3	<5.0	<5000	<5000	<250
Vinyl Chloride	ND-490	ND	<10.0	<5000	<5000	<250
Xylenes (total)	1.2-2.7	ND	DNA	DNA	DNA	DNA
1,2-Dichloroethene	1.7-6,500	ND-8.1	DNA	DNA	DNA	DNA
1,1,1-Trichloroethane	ND	ND	<5.0	<5000	<5000	<250
Chloroethane	ND	ND	<10	<10000	<10000	<500
Chloromethane	ND	ND	<10	<10000	<10000	<500
Chloroform	ND	ND	<5.0	<5000	<5000	<250
Styrene	ND	ND	DNA	DNA	DNA	DNA
1,1,2,2-Tetrachloroethane	ND	ND	<5.0	<5000	<5000	<250
1,1-Dichloroethene	ND	ND	<5.0	<5000	<5000	<250

ND = Not Detected
DNA = Did Not Analyze

Table 5-2 1992 – 1994 Data Summary – Metal Concentration Ranges

Chemical	Sludge (ppm)	Subsoil (ppm)	Monitoring Well RT-1 (mg/L)	Monitoring Well RT-2 (mg/L)	Monitoring Well RT-5 (mg/L)	Monitoring Well RT-4 (mg/L)
Arsenic	0.71-2.1	1.1-7.0	<0.010-0.12	<0.010-0.44	<0.010-0.023	<0.010-0.045
Barium	401-2,060	45.8-111	0.062-0.23	0.062-0.28	0.017-0.43	0.11-0.35
Cadmium	ND	<0.0050	0.0050	0.0050	0.0050	0.0050
Chromium	19,200-55,000	11.2-196	0.013-0.098	41-55	0.021-0.11	<0.010-0.058
Lead	104-638	ND-12.3	<0.005-0.022	<0.005-0.067	0.0056-0.032	<0.005-0.019
Mercury	ND	ND	<0.00020	<0.00020	<0.00020	<0.00020
Selenium	ND	ND	<0.050	<0.020	<0.050	<0.010
Silver	ND-2.6	ND	<0.010	<0.010	<0.010	<0.010

ND=Not Detected

In addition to institutional controls, Grenada Manufacturing is conducting post-closure groundwater monitoring at monitoring wells MW-23 and MW-24. Monitoring wells MW-23 and MW-24 will continue to be sampled for total chromium, hexavalent chromium, and pH on a semi-annual basis along with the monitoring associated with SWMU 2. This data will be submitted to the respective agencies in the annual site wide monitoring report. Semi-annual reports containing post-closure monitoring data for both SWMU 2 and SWMU 27 will be submitted to the respective agencies. Sampling of monitoring wells MW-23 and MW-24 will continue until the 30-year sampling period for the Equalization Lagoon (SWMU 2) is complete unless the analytical results from three (3) consecutive sampling events reveal no change or a continual decrease in total chromium. However, sampling will not be discontinued under any circumstances if analytical results are above MCLs or appropriate regulatory levels (GESI, 2003).

5.1.4 Indoor Air Background Information

As requested by the USEPA Region IV in a letter dated November 26, 2001, BC conducted an assessment of the potential for vapors from chemicals in the groundwater to be present in indoor air at the facility. This assessment was conducted using the draft guidance document "Supplemental Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway" dated October 23, 2001. This draft guidance was provided to BC by the USEPA prior to its publication in the Federal Register for public comment. This draft document provides guidance for assessing whether the subsurface vapor intrusion to indoor air pathway for human exposure is complete under Site conditions.

The results of the vapor intrusion assessment were presented in a letter to the USEPA dated February 26, 2002. The assessment identified ten VOCs that had the potential to exceed the target concentrations in at least one location for the groundwater monitoring wells that were identified as being near the main Plant building. The assessment concluded that there were insufficient data at the time of the assessment to indicate whether the vapor to indoor air pathway is complete and if indoor air quality has been impacted. In its letter dated June 14, 2002, the USEPA requested that an Indoor Air Monitoring Work Plan be prepared for conducting indoor air monitoring to collect data to further assess the vapor to indoor air pathway, and also asked that toluene be added to the analyte list.

The draft report titled "Draft Indoor Air Monitoring Report, Grenada, Manufacturing Site, Grenada, Mississippi" was submitted to the USEPA in April 2003. This report summarized the air monitoring activities and results for air monitoring that was conducted on February 17, 2003 at the Site. In a letter dated May 17, 2004, the USEPA indicated that additional indoor air sampling would be required at the Grenada manufacturing facility to supplement the date from the February 17, 2003 sampling event. On behalf of Grenada Manufacturing, BC submitted a response letter to the USEPA on May 26, 2004. After follow-up conversations with the USEPA, the Agency, in its email to BC dated June 21, 2004, gave approval for Grenada Manufacturing to proceed with indoor air sampling in the Summer of 2004. The additional air monitoring occurred on August 18, 2004 and the report was submitted in December 2004. Subsequently, as part of modifications to the facility HSWA permit, the USEPA established a biennial (once every two years) monitoring schedule for indoor air.

5.2 Problem Definition

5.2.1 Equalization Lagoon and Chrome Plating Operation Closure

The purpose of this monitoring program is to demonstrate the effectiveness of closure activities for the Equalization Lagoon and the Chrome Plating Operation (the Chrome Plating Lines and the Chrome Destruct Pit), as required by RCRA standards.

In order to achieve this goal, monitoring is required to ensure the appropriate performance and design of the closure activities. The process of testing requires multiple sampling and analysis events to support statistical evaluation of the impact, if any, of the closures.

5.2.2 Additional Sampling and Monitoring for Corrective Measures

Currently, there is insufficient information to evaluate Corrective Measures. Specifically, more detailed information is needed regarding the horizontal and vertical distribution of VOCs and inorganics. Site data is also necessary to define the top and bottom of the shallow aquifer, as the thickness of the saturated interval and the depths to groundwater and the aquitard are important considerations in selecting a technology with respect to feasibility of construction methods and for monitoring effectiveness of those technologies. Further, existing data should be used to model groundwater flow, as the seepage velocity is critical to performance feasibility of some technologies. Additional soil data from the Site, including any of the SWMUs, will also be collected to evaluate appropriate corrective measures.

The proposed additional sampling and monitoring events will supplement the RI and RFI by including sampling and analysis of existing and new monitoring wells and surface water and sediment in Riverdale Creek to provide current data regarding the distribution of key constituents in Site media and will help identify trends in constituent concentrations throughout the plume. Additional data will extend delineation to areas where corrective measures might be implemented. Both vertical and horizontal delineation are needed to select, design, and monitor appropriate corrective measures.

Descriptions of the sampling and monitoring programs are presented in Section 6.0.

6.0 Task Description and Schedule

6.1 Corrective Measures Groundwater, Surface Water, and Sediment Monitoring Task

During meetings held at Grenada Manufacturing in April 2000 and July 2003, the results of previous investigations and Interim Measures (IM) were discussed. The USEPA, MDEQ, Grenada Manufacturing, ArvinMeritor, and BC agreed that additional groundwater sampling would be performed to update the groundwater database and incorporate the updated information into the Site database. Accordingly, a Site-wide "baseline" groundwater-sampling event was conducted to supplement the IM study and update the RFI in November 2003. Thirty-six (36) monitoring wells were sampled and analyzed for VOCs, semi-volatile organic compounds (SVOCs), target analyte list (TAL) metals, and hexavalent chromium to assess current groundwater quality at the Site. In addition, these wells were sampled for field analysis of indicator parameters for biodegradation of VOCs to include carbon dioxide, iron (II), manganese (II), hydrogen sulfide, and dissolved oxygen. Table 6-1 presents a list of the monitoring wells sampled. Monitoring wells MW-43, MW-44, MW-49, and MW-50 were not sampled during the "baseline" event as these four wells had not been installed. The locations of the monitoring wells are presented on Figure 6-1. Table 6-2a presents the list of laboratory parameters to be analyzed (in bold type). The available maximum contaminant levels (MCLs) only for the Site constituents of concern are presented in Table 6-2a. The methods and procedures that will be followed to conduct the groundwater sampling are presented in Section 9.0.

Surface water and sediment sampling were also performed at five locations within Riverdale Creek: surface water (SW-9, SW-12, SW-17, SW-19, and SW-22) and sediment (SD-4, SD-7, SD-9, SD-12, and SD-17). Figure 6-2 presents the locations of the surface water and sediment samples. The surface water and sediment samples were analyzed for VOCs, SVOCs, and metals. Groundwater, surface water, and sediment monitoring will be performed during the Correct Measures at different locations. Section 6.8 describes the monitoring schedule.

LEGEND

- UPPER MOST AQUIFER SHALLOW MONITORING WELL
- UPPER MOST AQUIFER DEEP MONITORING WELL

SOURCE MAP PREPARED BY ALMON ASSOCIATES, 1993 (UPDATED 2005) WELL LOCATIONS SHOWN ARE APPROXIMATE

SCALE 300 0 300 600 FEET

FIGURE 6-1

MONITORING WELL LOCATION MAP

GRENADA STAMPING AND ASSEMBLY SITE
GRENADA, MISSISSIPPI

129874 001 4/06

BROWN AND CALDWELL Nashville, Tennessee

Apr 27, 2006 - 1:56pm cwarc

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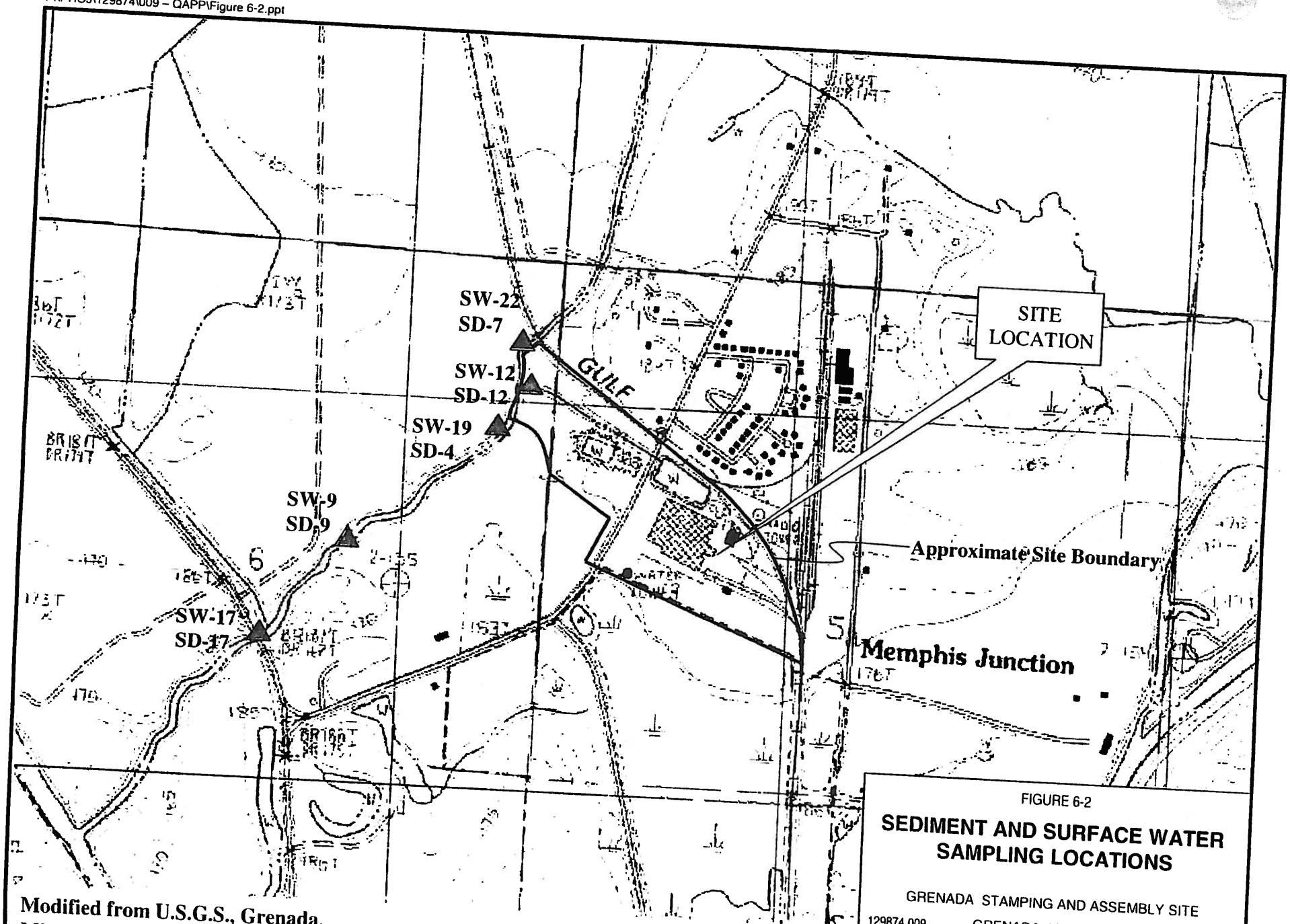

FIGURE 6-2

SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS

GRENADA STAMPING AND ASSEMBLY SITE

129874.009 GRENADA, MISSISSIPPI

BROWN AND CALDWELL Nashville, Tennessee

4/06

Table 6-1 Monitoring Well Network

Well Name	
MW-1	MW-41*
MW-2	MW-42*
MW-3	MW-43*
MW-4	MW-44*
MW-5*	MW-45*
MW-6	MW-46*
MW-7	MW-47*
MW-8	MW-48*
MW-10*	MW-49*
MW-11	MW-50*
MW-12	MW-51*
MW-13	MW-52*
MW-14*	MW-53*
MW-15	MW-54*
MW-16	MWRT-1
MW-17	MWRT-2
MW-20	MWRT-3
MW-23	MWRT-4
MW-24	MWRT-5
MW-25	

* PRB Monitoring Plan Wells

6.2 Equalization Lagoon Post-Closure Monitoring Task

Existing monitoring wells MWRT-2, MWRT-4, MWRT-5, and MW-23 will be used as sampling locations for the requirements of this monitoring program. Monitoring well MW-23 replaced MWRT-1 as a background monitoring well as approved in the March 2001 permit revision. The remaining three monitoring wells represent locations downgradient of the closed lagoon where potential impacts would be first detected.

Samples were collected quarterly from each of the four listed wells for the first year of the project. The sampling frequency was reduced to semiannually for the four wells for the second through thirtieth years. Samples will be collected and analyzed for select VOCs, SVOCs, and metals. Table 6-2a presents the list of laboratory parameters and specific compounds to be analyzed in samples from wells associated with the closed Equalization Lagoon (designated with an "X" in the column on the right). The available maximum contaminant levels (MCLs) are presented in Table 6-2a. The required methods and procedures to conduct the groundwater sampling are presented in Section 9.0.

Table 6-2a Parameters to be Measured (Groundwater)

Analyte	CAS #	SW-846 Preparation Method	SW-846 Analytical Method	SW-846 Clean-Up Method	MCLs[b] (µg/L)	Analytical PQL MDL (µg/L)	Laboratory PQL (µg/L)	Laboratory MDL (µg/L)	Equalization Lagoon Analytes
Inorganics									
Arsenic[a]	7440-38-2	3005A	6010B	NA	50	NA	10	3.0	X
Chromium (total)[a]	7440-47-3	3005A	6010B	NA	100	NA	10	2.0	X
Lead	7439-92-1	3005A	6010B	NA	15	NA	3.0	1.5	X
Selenium	7782-49-2	3005A	6010B	NA	50	NA	10	3.0	X
Chromium (hexavalent)[a]	7440-47-3	Modified 7196A	6010B	NA	NA	NA	25	10	
Volatile Organic Compounds (VOCs)									
Vinyl Chloride[a]	75-01-4	5030B	8260C	NA	2	5.0	5.0	2.0	X
Chloroethane	75-00-3	5030B	8260C	NA	NA	5.0	5.0	2.0	X
Methylene Chloride	75-09-2	5030B	8260C	NA	NA	5.0	5.0	1.0	X
Acetone	67-64-1	5030B	8260C	NA	NA	5.0	10	5.0	X
Carbon Disulfide	75-15-0	5030B	8260C	NA	NA	5.0	5.0	1.0	X
1,1-Dichloroethene[a]	75-35-4	5030B	8260C	NA	7	5.0	5.0	1.0	X
1,1-Dichloroethane	75-34-3	5030B	8260C	NA	NA	5.0	5.0	2.0	X
cis-1,2-Dichloroethene[a]	156-59-4	5030B	8260C	NA	70	5.0	5.0	1.0	
Trans-1,2-Dichloroethene	156-60-5	5030B	8260C	NA	100	5.0	5.0	1.0	X
1,2-Dichloroethane[a]	107-06-2	5030B	8260C	NA	5	5.0	5.0	1.0	
1,1,1-Trichloroethane	71-55-6	5030B	8260C	NA	200	5.0	5.0	1.0	X
1,2-Dichloropropane	78-87-5	5030B	8260C	NA	5	5.0	5.0	1.0	X
Trichloroethene[a]	79-01-6	5030B	8260C	NA	5	5.0	5.0	1.0	X
1,1,2-Trichloroethane[a]	79-00-5	5030B	8260C	NA	5	5.0	5.0	1.0	X
Benzene[a]	71-43-2	5030B	8260C	NA	5	5.0	5.0	1.0	X
Tetrachloroethene[a]	127-18-4	5030B	8260C	NA	5	5.0	5.0	1.0	X
Toluene[a]	108-88-3	5030B	8260C	NA	1000	5.0	5.0	1.0	X
Ethylbenzene	100-41-4	5030B	8260C	NA	700	5.0	5.0	1.0	X
Xylenes (total)	1330-20-7	5030B	8260C	NA	10,000	5.0	5.0	1.0	X

Table 6-2a Parameters to be Measured (Groundwater), Continued

Analyte	CAS #	SW-846 Preparation Method	SW-846 Analytical Method	SW-846 Clean-Up Method	MCLs[b] (µg/L)	Analytical PQL MDL (µg/L)	Laboratory PQL (µg/L)	Laboratory MDL (µg/L)	Equalization Lagoon Analytes
Semivolatile Organic Compounds (SVOCs)									
1,2,4-Trichlorobenzene	120-82-1	3510C	8270C	3640A	70	10	5.0	2.0	X
Naphthalene	91-20-3	3510C	8270C	3640A	NA	10	5.0	2.0	X
2-Methylnaphthalene	91-57-6	3510C	8270C	3640A	NA	10	5.0	2.0	X
Pentachlorophenol	87-86-5	3510C	8270C	3640A	1	10	10	5.0	X
bis(2-Ethylhexyl)phthalate[a]	117-81-7	3510C	8270C	3640A	6	10	5.0	2.0	X
1,2,4,5-Tetrachlorobenzene[c]	95-94-3	3510C	8270C	3640A	NA	10	10.0	3.1	X
BIOPARAMETERS									
Ammonia		350.1	350.1	NA	NA	200	200	50	
Phosphorous (Total)		365.3	365.3	NA	NA	60	60	20	
TKN		351.2	351.2	NA	NA	1500	1500	50	
Chloride		9251	9251	NA	25000[c]	500	500	170	
Iron (total)		3005A	6010B	NA	300[c]	50	100	30	
Manganese (total)		3005A	6010B	NA	50[c]	5.0	15	3.0	
Nitrate/nitrite		353.2	NA	NA	1000	250	250	50	
Sulfate		300	300	NA	250.000	500	500	170	
Ethane		AM20GAX	NA	NA	NA	NA	NA	NA	
Ethene		AM20GAX	NA	NA	NA	NA	NA	NA	
Methane		AM20GAX	NA	NA	NA	NA	NA	NA	
Alkalinity (carbonate/bicarbonate)		NA	NA	NA	NA	1000	1000	620	
Dissolved Total Organic Carbon (TOC)		415.2	NA	NA	NA	1000	1000	1000	
Volatile Fatty Acids		5560C	5560C	NA	NA	NA	NA	NA	

[a] – RFI Constituent of Concern

[b] – MCL for RFI Constituent of Concern and Equalization Lagoon Constituents of Concern based on National Primary Drinking Water Standards (EPA 816-F-02-013), July 2002.

[c] – National Secondary Drinking Water Standard (EPA 816-F-02-013)

NA = Not Applicable

Source: SW-846 Third Edition Final Up-date 3

Table 6-2b Parameters to be Measured (Soil/Sediment/Sludge)

Analyte	CAS #	SW-846 Preparation Method	SW-846 Analytical Method	Laboratory MDL	Laboratory RL	Units
Ammonia		NA	350.1	0.50	1.5	mg/kg
Cyanide		NA	9012A	0.125	0.25	mg/kg
Nitrate/Nitrite		NA	300.0	2.5	0.50	mg/kg
METALS						
Arsenic[a]	7440-38-2	3050B	6010B	0.60	2.0	mg/kg
Chromium (total)[a]	7440-47-3	3050B	6010B	0.40	2.0	mg/kg
Lead	7439-92-1	3050B	6010B	0.30	0.6	mg/kg
Hexavalent Chromium[a]	7440-47-3	3060A	Modified 7196A	0.40	1.0	mg/kg
VOCs						
Vinyl Chloride[a]	75-01-4	5035B	8260B	1	10	mg/kg
1,1-Dichloroethene[a]	75-35-4	5035B	8260B	1	5	mg/kg
cis-1,2-Dichloroethene[a]	156-59-4	5035B	8260B	1	5	mg/kg
1,2-Dichloroethane[a]	107-06-2	5035B	8260B	1	5	mg/kg
Trichloroethene[a]	79-01-6	5035B	8260B	1	5	mg/kg
1,1,2-Trichloroethane[a]	79-00-5	5035B	8260B	1	5	mg/kg
Benzene[a]	71-43-2	5035B	8260B	1	5	mg/kg
Tetrachloroethene[a]	127-18-4	5035B	8260B	1	5	mg/kg
Toluene[a]	108-88-3	5035B	8260B	1	5	mg/kg
SVOCs						
bis(2-Ethylhexyl)phthalate[a]	117-81-7	3541	8270C	100	330	mg/kg

Table 6-2b Parameters to be Measured (Soil/Sediment/Sludge), Continued

Analyte	CAS #	SW-846 Preparation Method	SW-846 Analytical Method	Laboratory MDL	Laboratory RL	Units
OTHER ANALYSES						
pH	NA	NA	9045B	NA	NA	NA
Sulfide	NA	NA	376.1	0.75	1.0	mg/L
Sulfate	NA	NA	300.0	0.17	0.50	mg/L
Sulfite	NA	NA	377.1	20	NA	mg/L
TOC	NA	NA	Modified 9060	470	1600	mg/kg
Oil and grease	NA	NA	1664A	1.67	2.0	mg/L
TCLP Metals	NA	1311/3010A	6010B/7470	0.05 – 0.25	Various	ppm
TCLP VOCs	NA	1311	8260B	0.01 – 0.1	Various	ppm
TCLP SVOCs	NA	1311/3510B	8270C	0.13 – 900	Various	ppm

[a] – RFI Constituent of Concern

[b] – MCL for RFI Constituent of Concern and Equalization Lagoon Constituents of Concern based on National Primary Drinking Water Standards (EPA 816-F-02-013), July 2002.

[c] – National Secondary Drinking Water Standard (EPA 816-F-02-013)

NA = Not Applicable

Source: SW-846 Third Edition Final Up-date 3

Table 6-2c Parameters to be Measured (Air)

Analyte	CAS #	EPA Method[b]	Laboratory MDL	Laboratory RL	Units	Target Indoor Air Screening Concentration for Non-Carcinogens[c] HI = 1 (ppb_v)	Target Indoor Air Screening Concentration for Carcinogens[d] Risk = 10 (ppb_v)	OSHA 8-hour TWA PEL[e] (ppb_v)
VOCs[a]								
1,1-Dichloroethene	75-35-4	TO-15	0.19	0.5	$\mu g/m^3$	50	NA	NA
1,2-Dichloroethane	107-06-2	TO-15	0.081	0.5	$\mu g/m^3$	NA	0.4	50,000
1,1,2-Trichloroethane	79-00-5	TO-15	0.15	0.5	$\mu g/m^3$	NA	0.5	10,000
Benzene	71-43-2	TO-15	0.076	0.5	$\mu g/m^3$	NA	1.6	1,000
cis-1,2-Dichloroethene	156-59-4	TO-15	0.077	0.5	$\mu g/m^3$	8.8	NA	200,000
Methylene chloride	75-09-2	TO-15	0.14	0.5	$\mu g/m^3$	NA	25.4	25,000
Tetrachloroethene	127-18-4	TO-15	0.17	0.5	$\mu g/m^3$	NA	1	100,000
Toluene	108-88-3	TO-15	0.034	0.5	$\mu g/m^3$	110	NA	200,000
trans-1,2-Dichloroethene	156-60-5	TO-15	0.076	0.5	$\mu g/m^3$	18	NA	200,000
Trichloroethene	79-01-6	TO-15	0.13	0.5	$\mu g/m^3$	NA	3.7	25,000
Vinyl Chloride	75-01-4	TO-15	0.11	0.5	$\mu g/m^3$	NA	1.8	1,000

[a] – Constituent of Concern.

[b] – Matrix composition and concentrations can be analyzed by TO-15 GC/MS full scan or Selected Ion Monitoring (SIM) mode.

[c] – Target Screening Concentrations were obtained from Table 2b (10^{-5} risk) of the Draft Vapor Intrusion Guidance Document published by the USEPA on November 29, 2002.

[d] – Concentrations are adjusted for industrial exposure scenario as obtained from a USEPA Office of Technical Services (OTS) memorandum dated June 16, 2003

[e] – Concentration is adjusted for industrial use scenario found originally from California EPA Toxicity Screening Criteria. See USEPA OTS memorandum dated June 16, 2003.

6.3 Chrome Plating Line Area Monitoring Task

In accordance with the post-closure care monitoring, groundwater samples will be collected from monitoring wells MW-24, located southeast of the Chromium Plating Line Area (SWMU 27), and MW-23, located downgradient of SWMU 27. Samples will be collected semiannually from each well. Groundwater samples will be analyzed for total and dissolved chromium, total and dissolved hexavalent chromium, and pH.

Table 6-3a Field and Quality Control Sample Summary (per event)

Corrective Measures Sampling

Medium/ Matrix	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference	No. of Sampling Locations		No. of Field Duplicate Pairs[1]		No. of Lab Splits[1]		No. of MS[2]		No. of MSD[2]		No. of Trip Blanks[3]		No. of Field Blanks[4]		No. of PE Samples
				A	B	A	B	A	B	A	B	A	B	A	B	A	B	
Groundwater	VOC	Low	8260B	40	17	2	1	0	0	2	1	2	1	TBD	TBD	2	1	NA
Groundwater	SVOC	Low	8270C	40	NA	2	NA	0	NA	2	NA	2	NA	TBD	NA	2	NA	NA
Groundwater	TAL Metals	Low	6010, 9012	40	17	2	1	0	0	2	1	2	1	NA	NA	2	1	NA
Groundwater	Hexavalent Chromium	Low	7196A	40	17	2	1	0	0	2	1	2	1	NA	NA	2	1	NA
Surface Water	VOC	Low	8260B	5		1		0		0		0		1		0		NA
Surface Water	Metals	Low	6010B, 9012	5		1		0		0		0		NA		0		NA
Surface Water	Hexavalent Chromium	Low	7196A	5		1		0		0		0		NA		0		NA
Sediment/Soil	VOC	Low	5030B, 8260B	5		1		0		0		0		1		0		NA
Sediment/Soil	Metals	Low	3005A, 6010B	5		1		0		0		0		NA		0		NA
Sediment/Soil	Hexavalent Chromium	Low	7196 A	5		1		0		0		0		NA		0		NA

A. Biennially Site Wide Groundwater Sampling Event
B. PRB Groundwater Monitoring Event
TBD = To be determined
[1] – One duplicate sample will be collected per 20 groundwater samples.
[2] – One MS/MSD sample will be collected per 20 groundwater samples.
[3] – One trip blank will be included in each shipment of samples.
[4] – One field blank will be collected per 20 groundwater samples.
NA – Not Applicable

Table 6-3b Field and Quality Control Sample Summary (per event)

Additional Corrective Measures Soil Sampling and NAPL Delineation Tasks

	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs[1]	No. of Lab Splits[2]	No. of MS	No. of MSD	No. of Trip Blanks[2]	No. of Field Blanks[2]	No. of PE Samples
Soil/Sludge	VOC	Low	8260B	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	SVOC	Low	8270C	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	pH	NA	9045B	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Sulfide	NA	376.1	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Sulfate	NA	300.1	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Sulfite	NA	377.1	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Ammonia	350.2	350.2	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Cyanide	NA	9012A	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Nitrite/ Nitrate	NA	300.1	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TOC	NA	Modified 9060	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	Oil and grease	NA	1664A	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TCLP Metals	NA	6010B/7470	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TCLP VOCs	NA	8260B	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
	TCLP SVOCs	NA	8270C	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD

Table 6-3c Field and Quality Control Sample Summary (per event)

Equalization Lagoon Post-Closure Sampling

Medium/ Matrix	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs[1]	No. of Lab Splits[2]	No. of MS	No. of MSD	No. of Trip Blanks[2]	No. of Field Blanks[2]	No. of PE Samples
Groundwater	VOC	Low	8260B	4	1	0	1	1	1	1	NA
Groundwater	SVOC	Low	8270C	4	1	0	1	1	NA	1	NA
Groundwater	Metals	Low	6010B	4	1	0	1	1	NA	1	NA

Table 6-3d Field and Quality Control Sample Summary (per event)

Chrome Plating Line Area Sampling

Medium/ Matrix	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs[1]	No. of Lab Splits[2]	No. of MS	No. of MSD	No. of Trip Blanks[2]	No. of Field Blanks[2]	No. of PE Samples
Groundwater	Chromium	Low	6010B	2	1	0	1	1	NA	1	NA
Groundwater	Hexavalent Chromium	Low	7196	2	1	0	1	1	NA	1	NA
Groundwater	pH (field)	Low	9045C	2	1	0	0	0	NA	NA	NA

1 – Field quality control
2 – Laboratory quality control
NA = Not applicable.

Table 6-3e Field and Quality Control Sample Summary (per event)

Indoor Air Sampling

Medium/ Matrix	Analytical Parameter	Conc. Level	Analytical Method/ SOP Reference	No. of Sampling Locations	No. of Field Duplicate Pairs[1]	No. of Lab Splits	No. of MS	No. of MSD	No. of Trip Blanks	No. of Field Blanks[2]	No. of PE Samples
Air	VOC	Low	EPA TO-15	14	3	0	0	0	0	1	NA

A – Biennially Indoor Air Sampling Event
1 – One duplicate sample will be collected for each work zone (i.e., Zone A, B, C)
2 – One field blank will be collected per sampling event.
NA – Not Applicable.

6.4 Corrective Measures Direct-Push Groundwater and Soil Sampling Task

Groundwater sampling using direct-push technology such as Geoprobe® may be conducted to provide additional data to supplement the Corrective Measures. Either temporary piezometers or the use of a direct-push sampler will be used to collect groundwater samples.

One-inch piezometers may be installed at specified locations. The piezometers will be installed using direct-push methods within either the upper portion of the water table aquifer (approximately 25 feet below ground surface) or lower portion of the aquifer (approximately 45 to 50 feet below ground surface). Piezometers may be completed with a 4-inch diameter locking steel protective casing and surveyed for horizontal and vertical control in order to keep the integrity of the piezometer for the purposes of collecting groundwater elevation measurements and initial groundwater quality.

If temporary piezometers are not used, a direct-push sampler will be used to collect groundwater samples. The decontaminated sampler will be driven to the desired sampling depth. The sampler barrel will be retracted to expose the sampler screen allowing groundwater to flow into the sampler. A peristaltic pump with tygon tubing will be used to purge approximately three sampler volumes. Once the sampler has been purged, a groundwater sample will be collected through the pump in 40-ml containers for VOC analyzes. The samples will be handled and labeled in accordance with the groundwater sampling section.

Continuous soil cores will be collected from each direct-push sampling location. The groundwater samples and soil cores will be collected in accordance with the sampling procedures and requirements presented in Section 9.0.

6.5 Additional Corrective Measures Soil Sampling and NAPL Delineation Tasks

6.5.1 NAPL Delineation in Lagoon and Main Plant Areas

Additional light and dense non-aqueous phase liquid (LNAPL and DNAPL) delineation is required in the Sludge Lagoon Area (SWMU 4) and in the main plant area (AOC A).

Sludge Lagoon Area
DNAPL wells (between 45 to 55 feet deep) and LNAPL wells (approximately 20 to 25 feet deep) will be installed in order to obtain information necessary to design the NAPL recovery system (if required). Soil samples will be collected from the screened intervals. The wells are expected to be temporary and will be used to detect LNAPL/DNAPL in the lagoon area.

Main Plant Area
DNAPL wells (between 45 to 55 feet deep) will be installed to obtain information necessary to design an improved NAPL recovery system (if appropriate). Soil samples or cone penetrometer

data will be collected from the screened intervals. The wells are expected to be temporary and used to detect the extents of DNAPL in the former TCE storage area.

6.5.2 Vadose Zone Soil Contamination Delineation

Soil borings (approximately 15 feet deep) will be advanced to delineate the extent of the vadose zone soil contamination in the Sludge Lagoon area (SWMU 4). Selected soil samples will be submitted for chemical analysis to determine the contaminant levels. Parameters will include VOCs and metals (Table 6-2b).

In addition, up to three angled borings will be advanced under the lagoon. These borings will be performed to collect samples for chemical analysis and information about the construction of the lagoon. Chemical analysis parameters will include VOCs and metals (Table 6-2b).

6.5.3 Sludge Characterization and Treatability Study

Data regarding the nature and extent of the sludge present in the Sludge Lagoon will need to be collected to allow for the design of the sludge stabilization and capping/cover system. Existing information indicates that the lagoon is clay lined. The depth of the lagoon and the present nature and depth of the sludge in the lagoon is unknown.

To characterize the nature of the sludge, sludge samples and sludge thickness data may be collected from the lagoon to the extent practicable. Sludge samples would be submitted for chemical analysis prior to mixing with solidification/stabilization agents. The chemical analysis parameters will include:

1. Ammonia
2. Cyanide
3. Metals (including hexavalent chromium and mercury)
4. Nitrite & Nitrate
5. pH
6. Volatile Organic Compounds
7. Semivolatile Organic Compounds
8. Sulfide, Sulfate & Sulfite
9. Total Organic Carbon
10. Oil and Grease
11. Free Liquids
12. TCLP Metals, Volatile, and Semivolatile Organic Compounds

The chemical analysis data can be used to select materials that will potentially be suitable for solidification or stabilization of the sludge. A bench-scale treatability study can then be performed on the sludge samples using solidification/stabilization agents to evaluate the performance of the selected solidification or stabilization materials. The solidified/stabilized material will be allowed to cure for 28 days. Pre- and post-solidification/stabilization strength testing using a pocket penetrometer will also be performed.

Depending on the results of the initial toxicity characteristic leaching procedure (TCLP) analyses, the solidified/stabilized sludge may be submitted for chemical analysis using the TCLP to get an indication of the potential for constituents to leach from the treated sludge. If the initial TCLP analyses performed on the raw sludge do not indicate that the raw sludge is a hazardous waste, then TCLP analyses will not be performed on the solidified/stabilized sludge.

6.5.4 Dual Phase High Vacuum Extraction Pilot Test

A pilot dual phase high vacuum extraction test may be conducted in the Former Toluene Storage Area (AOC B) to evaluate the potential for reduction of the contaminant source in this area. Existing wells RC-1, RC-2, RC-3, RC-4 and MW-24 may be utilized during the performance of the pilot test. Also, additional monitoring points may be installed to a depth of up to 25 feet adjacent to the existing wells. Each monitoring point would consist of a well screened across the vadose zone to below the groundwater level.

The pilot study would help determine:

- Approximate radius of influence (ROI) of vacuum extraction using vertical wells
- Need for gas emission control
- Changes in groundwater chemistry [i.e., monitor VOCs, methane, and indicators of oxidation state such as DO, ORP, Fe(II)]

The pilot system will operate by extracting air, groundwater, and residual LNAPL. The pilot test system will be designed and installed to be intrinsically safe due to the potential presence of toluene. The extracted vapors will pass through a liquid separator, air filter, flow indicator, the blower, activated carbon, and to a discharge point.

Samples of the extracted vapor and groundwater would be collected to monitor the effectiveness of the system at removing toluene under the different test conditions. Pressure changes and toluene concentrations would be measured in monitoring probes located above and below the water table. Dissolved oxygen would also be measured below the water table. Air sampling would be performed using field instruments to determine the concentrations of vapors being removed by the system and the presence of these vapors in the monitoring probes.

6.6 Indoor Air Monitoring Task

A total of 14 composite air samples including 1 field blank were collected inside the main Plant building (see Figure 6-3) at three zones. The samples were collected in six-liter summa canisters fitted with time integrated flow controllers.

Zone A – Office areas
Zone B – Production floor/areas
Zone C – Basement

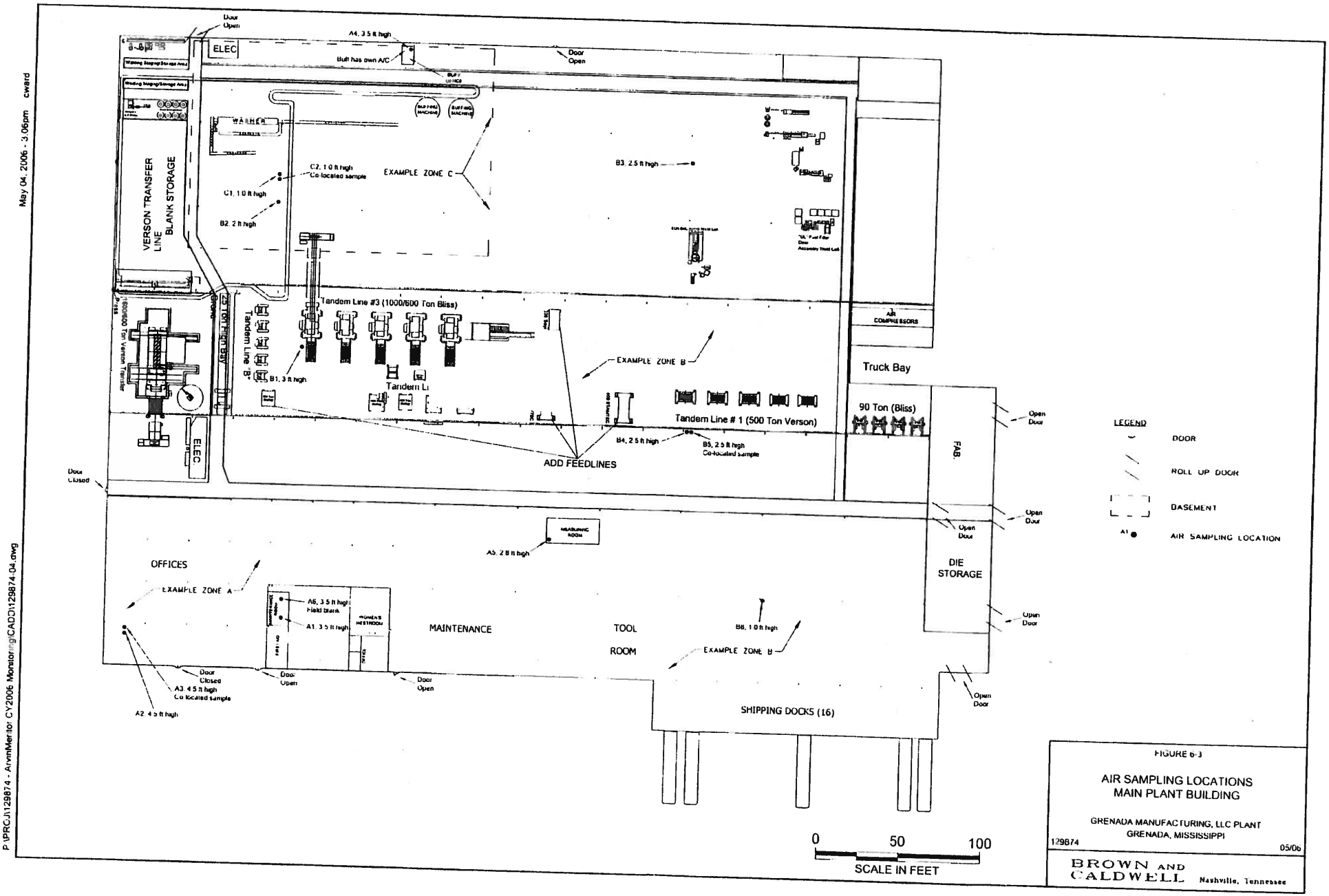

FIGURE 6-3

AIR SAMPLING LOCATIONS
MAIN PLANT BUILDING

GRENADA MANUFACTURING, LLC PLANT
GRENADA, MISSISSIPPI

129874 05/06

BROWN AND CALDWELL Nashville, Tennessee

May 04, 2006 - 3:06pm cward

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One QA/QC or duplicate composite air sample was also collected in each zone. The samples were analyzed for 11 VOCs to assess their indoor air concentration during an 8-hour work period. Table 6-4a shows a list of the 11 parameters to be measured. Table 6-4b shows the field quality control sample summary. The methods and procedures to conduct the air sampling are discussed in Section 9.0.

6.7 Field Quality Assurance/Quality Control Sampling

QA/QC samples will be systematically collected during each field sampling event. These samples generate data to evaluate the quality of both field and laboratory procedures. In general, field duplicate samples are performed at a rate of one per every twenty samples taken. Tables 6-3a, 6-3b, 6-3c, and 6-3d summarize the numbers of samples to be collected. Procedures for reporting QA/QC results are discussed in Sections 17.0, 18.0, and 19.0.

6.8 Project Schedule

6.8.1 Corrective Measures Direct-Push Groundwater and Soil Sampling

Additional sampling to assist with Site constituent delineation or for collection of supplemental physical data will be collected when appropriate within the Corrective Measures process. Specific detail regarding schedules will be included with the associated work plan.

6.8.2 Corrective Measures Groundwater, Surface Water, and Sediment Monitoring

Groundwater monitoring, which includes collecting groundwater elevations at each specified monitoring well and groundwater sampling, will be performed on a Site-wide basis (see Table 6-1 for the list of monitoring wells) once every two years. Samples will be analyzed for the target list of VOCs, SVOCs, metals, and bioparameters. PRB performance monitoring, which includes collecting groundwater elevations at each specified monitoring well and groundwater sampling, will be performed twice a year. Table 6-1 indicates the monitoring wells which are included within this sampling plan. Surface water samples from Riverdale Creek will be collected on a quarterly basis, while sediment samples will only be collected once every two years (between the months of May and October).

6.8.3 Additional Corrective Measures Soil Sampling and NAPL Delineation Tasks

The NAPL delineation in the Lagoon and Main Plant areas, the vadose zone soil contamination delineation, the sludge characterization and treatability study, and the dual phase high vacuum extraction pilot test activities will occur if and when appropriate within the Corrective Measures process. Specific detail regarding schedules will be included with the associated work plan.

6.8.4 Equalization Lagoon Post-Closure Monitoring

Samples will be collected semiannually from each of the four wells (MW-23, MWRT-2, MWRT-4, and MWRT-5). In accordance with Grenada's HWM Permit, groundwater samples obtained from the closed Equalization Lagoon wells will be analyzed for chromium, toluene, trichloroethene, and those constituents previously detected by MHWMR 264 Appendix IX (RCRA metals, VOCs, and SVOCs only) analyses. These constituents are outlined in Table 6-2a.

6.8.5 Chrome Plating Line Area Monitoring

Groundwater samples will be collected semiannually from monitoring wells MW-23 and MW-24 along with the Equalization Lagoon post-closure monitoring. Sampling will continue as described in the Assessment Report and Closure Plan for the Chrome Plating Line Area dated January 2003. The sampling will continue until the 30-year monitoring period for SWMU 2 is complete unless analytical results from three consecutive sampling events indicate no change or a continual decrease in total chromium concentrations. However, sampling will not be discontinued if analytical results are above MCLs or appropriate regulatory levels.

6.8.6 Indoor Air Monitoring

Air samples will be collected once every two years starting from 2006. The samples will be analyzed for the same list of constituents in Table 6-4a and compared against the screening levels where applicable. The frequency of the sampling events may change upon EPA's request.

7.0 Project Quality Objectives and Measurement Performance Criteria

7.1 Data Quality Objective Process

The following presents the data quality objectives process that has been established for the Site.

State the Problem — Provide a description of the problem(s), specifications of available resources, and relevant deadlines for the study.

(1) *Members of the planning team* — The members of the planning team for the RCRA Corrective Action, Equalization Lagoon Post-Closure and Chrome Plating Line Area monitoring will include John Bozick, ArvinMeritor's Project Manager; Dale Showers, BC's Project Manager; Greg Christians, BC Task Manager and QA Officer.

(2) *Primary decision maker* — There will not be a primary decision maker; decisions will be made by consensus.

(3) *Description of the problem* — See Section 5.2.1.

(4) *Available resources and relevant deadlines for the study* — ArvinMeritor is committed to providing the necessary resources to complete the specified scope of work on the schedule outlined in Section 6.8.

Identify the Decision — Provide a statement of the decision that will use environmental data and the actions that could result from this decision.

(1) *The principal study question* —

RCRA Corrective Action - Is the current distribution of the Site parameters of concern consistent with that observed during the initial investigation? Is Riverdale Creek being impacted by Site parameters of concern? These questions will be addressed while performing the Corrective Measures.

Equalization Lagoon Closure- Is groundwater quality being impacted by the closed Equalization Lagoon?

Chrome Plating Operations Closure- Is groundwater quality being impacted by the closed Chrome Plating Operations?

(2) *Alternative actions that could result from resolution of the principal study question* — The selection and design of Site-specific Corrective Measures.

(3) *Combine the principal study question and the alternative actions into a decision statement* —

RCRA Correction Action- Once the distribution of Site parameters of concern and potential impacts to Riverdale Creek have been defined, Corrective Measures will be designed and implemented.

Equalization Lagoon Closure – If impacts to groundwater quality are observed, potential corrective action will be evaluated.

Chrome Plating Operations Closure – If impacts to groundwater quality are observed, potential corrective action will be evaluated.

Identify the Inputs to the Decision — Provide a list of the environmental variables or characteristics that will be measured and other information needed to resolve the decision statement.

(1) *Information that will be required to resolve the decision statement* — Obtain measurements of the Site parameters listed in Table 6-2a in Site groundwater and parameters listed in Table 6-2b for soil, sediment, or sludge.

(2) *Sources for each item of information identified* — Groundwater will be sampled following the scope of work outlined in Section 6.0. The parameter list is presented in Table 6-2a. Soil, sediment, and sludge will be sampled following the scope of work outlined in Section 6.0 (see Table 6-2b for parameter list).

(3) *Information that is needed to establish the action level* — The action level will be based on the applicable RCRA regulations and the Site-specific risk assessment.

(4) *Confirm that appropriate measurement methods exist to provide the necessary data* — Groundwater quality data will be analyzed in accordance with EPA SW-846 methods.

Define the Boundaries of the Study — Provide a detailed description of the spatial and temporal boundaries of the problem, characteristics that define the population of interest, and any practical considerations for the study.

(1) *Characteristics that define the population of interest* — Groundwater in the shallow aquifer beneath and down-gradient of the Site will be analyzed.

(2) *The spatial boundary of the decision statement* —

(a) *The geographic area to which the decision statement applies*. Decisions will apply to source areas and impacted groundwater down-gradient of the source areas.

(3) *The temporal boundary of the decision statement* —

(a) *The timeframe to which the decision statement applies.* It will be assumed that the sampling data represent the current concentration of Site parameters of concern within groundwater.

(b) *Determine when to collect data.* Groundwater samples will be collected with respect to the Site Corrective Measures at 36 wells biennially. Groundwater samples will be collected twice a year at 17 wells under the PRB performance monitoring plan. Groundwater samples will be collected twice a year for the Lagoon Post-Closure monitoring. Groundwater samples will be collected twice per year for the Chrome Plating Line Area monitoring. Soil and groundwater samples will be collected once to delineate extent of LNAPL and DNAPL. Sludge samples will be collected once to allow for design of sludge stabilization and capping/cover system.

(4) *The scale of decision making* — The scale of decision making will be applied to source areas and groundwater at the Site.

(5) *Practical constraints on data collection* — The most important practical consideration that could interfere with the study is the inability to collect samples from monitoring wells due to inaccessibility (e.g., vegetative growth and flooding).

Develop a Decision Rule — To define the parameter of interest, specify the action level and integrate previous DQO outputs into a single statement that describes a logical basis for choosing among alternative actions.

(1) *The statistical parameter that characterizes the population of interest* — The planning team is interested in the concentration of Site parameters of concern in groundwater and soil.

(2) *Action level for the study* — The action level for the decision will be the RCRA regulatory and Site specific risk assessment concentrations developed for the Site.

(3) *Decision rule (an "if...then..." statement)* — If the concentration of an individual parameter is greater than the RCRA regulatory and/or Site-specific limit, then the parameter will be designated as a parameter of concern.

Specify Tolerable Limits on Decision Errors — Describe the decision maker's tolerable decision error rates based on a consideration of the consequences of making a decision error.

(1) *The possible range of the parameter of interest* — The suspected range of parameters are presented in the RFI Summary Document.

(2) *The decision errors and null hypothesis —*

(a) *Decision errors and the true state of nature for each decision error.* The planning team has determined that the two decision errors are (i) deciding that the parameter is of concern, and (ii) deciding that the parameter is not of concern when it truly is.

(b) *The potential consequences of each decision error.* The consequences of the two decision errors will be that the potential risk of the Site will be overstated or understated.

(c) *Which decision error has more severe consequences near the action level* - The planning team has concluded that decision error (ii) has the more severe consequences near the action level due to the potential for understating risk.

(d) *The null hypothesis (baseline condition) and the alternative hypothesis.* The baseline condition or null hypothesis (H) is "the parameter is of concern". The alternative hypothesis (H) is "the parameter is not of concern". The false positive decision error occurs when the null hypothesis is rejected when it is true. For this example, the false positive decision error occurs when the decision maker decides the parameter is not of concern when it truly is. The false negative decision error occurs when the null hypothesis is not rejected when it is false.

7.2 Data Quality Objectives

DQOs are qualitative and quantitative statements which specify the quality of the data required to support decisions made during closure activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. There are five analytical levels which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. These levels are:

- Screening (DQO Level 1): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring at the Site, preliminary comparison to ARARs, initial Site characterization to locate areas for subsequent and more accurate analyses, and for engineering screening of alternatives (bench-scale tests). These types of data include those generated on-Site through the use of HNu, pH, conductivity, and other real-time monitoring equipment at the Site.

- Field Analyses (DQO Level 2): This provides rapid results and better quality than in Level 1. This level may include mobile laboratory or field gas chromatography generated data depending on the level of quality control exercised. There will be no DQO Level 2 samples collected.

- Engineering (DQO Level 3): This provides an intermediate level of data quality and is used for Site characterization. Engineering analyses may include mobile laboratory or field gas chromatography generated data and some analytical laboratory methods (e g., laboratory data without full quality control documentation).

- Conformational (DQO Level 4): This provides the highest level of data quality and is used, for example, for purposes of risk assessment. These analyses require data validation procedures in accordance with EPA recognized protocols, approved analytical methods and analytical detection limits.

- Non-Standard (DQO Level 5): This refers to analyses by non-standard protocols, for example, when exacting detection limits or analysis of an unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to DQO Level 4 data. No sampling or analysis for this project will use DQO 5.

The selected data quality objective for the Corrective Action Sampling is Level 4. The selected data quality objective for the closed Equalization Lagoon and Chromium Plating Line Area long-term monitoring is Level 3. Approved analytical methods and detection limits will be used as in Level 4 data; however, data reporting and validation requirements are reduced as these sites have been characterized and are currently in long-term monitoring.

7.3 Project Quality Objectives

The precision, accuracy, representativeness, comparability, completeness, and sensitivity of the sampling and analytical procedures must be adequate to allow the data to be used to (1) delineate the constituents of concern in groundwater for the design and implementation of Corrective Measures, (2) compare the concentrations of constituents of concern in groundwater to appropriate standards (see Table 6-2a), and (3) delineate constituents of concern in selected soils, sediment, and sludge (see Table 6-2b).

Samples will be analyzed in the laboratory for the constituents listed in Tables 6-2a and 6-2b. These will be analyzed in accordance with USEPA-approved methods. Additional groundwater analyses will be conducted in the field to (1) indicate when wells have been sufficiently purged for sampling (pH, conductivity, temperature) and (2) as indicators of natural biological degradation (oxidation/reduction potential-ORP, carbon dioxide, iron (II), manganese (II), hydrogen sulfide, dissolved oxygen).

7.4 Measurement Performance Criteria

Measurement performance criteria (MPC) define the quality elements monitored and the acceptable performance for these elements. Tables 7-1 through 7-4 describe these in detail for accuracy, precision, and sensitivity. For sensitivity, achievement of practical quantitation limits (PQLs) posted in Tables 6-2a and 6-2b is sufficient to achieve the project objectives.

Table 7-1 Measurement Performance Criteria

Matrix Parameter Level	Sampling Procedure	Analytical Method/SOP	Data Quality Indicators (DQIs)	Measurement Performance Criteria	QC Sample and/or Activity Used to Assess Measurement Performance	QC Sample Assesses Error for Sampling (S), Analytical (A) or both (S&A)
Water VOC Low	5030B	8260B	Overall Precision	Within limits on Tables 7-2 – 7-4	Field Duplicates	S&A
			Laboratory Precision	Within limits on Tables 7-2 – 7-4	Matrix Spike and matrix spike duplicates	S&A
			Accuracy - Laboratory	Within limits on Tables 7-2 – 7-4	Matrix Spike and matrix spike duplicates	S&A
			Accuracy - Laboratory	Within limits on Tables 7-2 – 7-4	Laboratory Control samples	A
			Accuracy - Contamination	None >QL	Method Blanks/Equipment Blanks/Trip Blanks/Field Blanks	S&A
			Sensitivity	Calibration to QL	Verify low cal std is at QL	A
Water SVOC Low		8270C	Overall Precision	Within limits on Tables 7-2 – 7-4	Field Duplicates	S&A
			Laboratory Precision	Within limits on Tables 7-2 – 7-4	Matrix Spike and matrix spike duplicates	S&A
			Accuracy - Laboratory	Within limits on Tables 7-2 – 7-4	Matrix Spike and matrix spike duplicates	S&A
			Accuracy - Laboratory	Within limits on Tables 7-2 – 7-4	Laboratory Control samples	A
			Accuracy - Contamination	None >QL	Method Blanks/Equipment Blanks/Trip Blanks/Field Blanks	S&A
			Sensitivity	Calibration to QL	Verify low cal std is at QL	A
Water Metals	3005A	6010B/7470A/7196A	Overall Precision	Within limits on Tables 7-2 – 7-4	Field Duplicates	S&A
			Laboratory Precision	Within limits on Tables 7-2 – 7-4	Laboratory duplicates	S&A
			Accuracy - Laboratory	Within limits on Tables 7-2 – 7-4	Matrix Spike	S&A
			Accuracy - Laboratory	Within limits on Tables 7-2 – 7-4	Laboratory Control samples	A
			Accuracy - Contamination	None >QL	Method Blanks/Equipment Blanks/Trip Blanks/Field Blanks	S&A
			Sensitivity	Calibration to QL	Verify low cal std is at QL	A

Table 7-2 Analytical Laboratory Data Quality Objectives for Precision and Accuracy for Volatile Organic Compound Analyses

Parameter	Matrix	QC Compounds	Field[a] Duplicate Precision (RPD) %	MS/MSD Precision (RPD)[b] %	Blanks	LCS & MS/MSD[b] Accuracy (% R)	Surrogate[b] Accuracy (% R)
Volatile Organic	Aqueous	All analytes 1,1-Dichloroethene Trichloroethene Benzene Toluene Chlorobenzene Toluene-d_8 Bromofluorobenzene 1,2-Dichloroethane-d_4	≤30	 ≤ 14 ≤ 14 ≤ 11 ≤ 13 ≤ 13	< 2.5 x RL for methylene chloride; <5 x RL for acetone, 2-butanone; <RL for all other analytes	 61-145 71-120 76-127 76-125 75-130	 88-110 86-115 76-114

NOTES:

[a] Provisions for wider acceptance limits near the RL may be based on professional judgment during data review/validation.

[b] Limits are based on those given in the USEPA Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-media, Multi-concentration Revision OLMO3.1. Actual limits will vary with the historical limits established by each individual laboratory.

RPD = relative percent difference.

Table 7-3 Analytical Laboratory Data Quality Objectives for Semivolatile Organic Compound Precision and Accuracy

Parameter	QC Compounds	Field [a] Duplicate Precision (RPD) %	MS/MSD [b] Precision (RPD) %	Blanks	LCS & MS/MSD [a] Accuracy (% R)	Surrogate [a] Accuracy (% R)
Semivolatile Analysis	All analytes	≤50		≤ 5x RL for phthalates ≤ RL for all others		
	Phenol		≤ 42		12-110	
	2-Chlorophenol		≤ 40		27-123	
	1,4-Dichlorobenzene		≤ 28		36-97	
	N-Nitroso-di-n-propylamine		≤ 38		41-116	
	1,2,4-Trichlorobenzene		≤ 28		39-98	
	p-Chloro-m-cresol		≤ 42		23-97	
	Acenaphthene		≤ 31		46-118	
	4-Nitrophenol		≤ 50		10-80	
	2,4-Dinitrotoluene		≤ 38		24-96	
	Pentachlorophenol		≤ 50		9-103	
	Pyrene		≤31		26-127	
	Nitrobenzene-d_5					35-114
	2-Fluorobiphenyl					43-116
	Terphenyl-d_{14}					33-141
	Phenol-d_5					10-110
	2-Fluorophenol					21-110
	2,4,6-Tribromophenol					10-123
	2-Chlorophenol-d_4					33-110 *
	1,2-Dichlorobenzene-d_4					16-110 *

NOTES:

* Advisory Limits Only

[a] Provisions for wider acceptance limits near the RL may be based on professional judgment during data review/validation.

[b] Limits are based on those given in the USEPA Contract Laboratory Program, Statement of Work for Organic Analysis, Multi-media, Multi-concentration Revision OLMO3.1. Actual limits will vary with the historical limits established by each individual laboratory.

RPD = relative percent difference

Table 7-4 Analytical Laboratory Data Quality Objectives for Precision and Accuracy for Inorganic Compound Analyses

Parameter	Matrix	QC Compounds	Field [a] Duplicate Precision (RPD) %	Sample/MD Precision [a] (RPD) [a]	MS Accuracy [b] (% R)	Blanks	LCS/SRM Accuracy (% R)
Inorganics: Metals	Water	All analytes	≤50	<50% RPD for results >5x RL; difference <± 2x RL for results <5x RL	75-125 [b]	< ± RL	80-120

NOTES:

[a] Provisions for wider acceptance limits near the RL may be based on professional judgment during data review/validation.

[b] Unless the sample concentration exceeds the spike added concentration by a factor of 4 or more.

RPD = relative percent difference

Precision is the agreement between a set of replicate measurements without assumption or knowledge of the true value. Precision is assessed by means of duplicate/replicate sample analysis. Precision for the various analytical laboratory processes will be estimated using the relative percent difference (RPD) in the recoveries between duplicate samples. Matrix spike (MS) and matrix spike duplicate (MSD) samples will be analyzed where appropriate. In most cases, the samples to be used as MS/MSD samples and duplicates will be field duplicates. Precision for some of the analytical methods may also be assessed from the percent recoveries of surrogate spike compounds. Relative percent difference is calculated using one of the following methods:

$$\frac{(R_1 - R_2) \times 100}{R_{Bar}} \quad \text{or} \quad \frac{(S_1 - S_2) \times 100}{S_{Bar}}$$

where R_1, R_2 are the first and duplicate results and R_{Bar} is the average of the two and S_1, S_2 are the spike and duplicate spike results and S_{Bar} is the average of the two. Historical limits for RPD are determined from pairs of either replicates or spikes. The RPDs must be greater than zero to determine upper warning and control limits. Based on Shewhart's model from the Handbook for Analytical Quality Control in Water and Wastewater Laboratories, upper control and warning limits can be determined. The Upper Control Limit for pairs of data can be defined as follows:

$$3.27\ R$$

where R = the average range divided by the number of sets of duplicate measurements. The Upper Warning Limit is set at as 2.51 R.

The spiking procedures will be performed as recommended by the appropriate USEPA methods. The frequency for analysis of spiked duplicate (or replicate) samples will be approximately 1 per 20 samples (excluding QC samples), spaced as evenly through the sequential analysis of samples as practical.

Accuracy is the nearness of a measurement or the mean ($\bar{x}$) of a set of measurements to the true value. Accuracy is assessed by the analysis of reference samples and by percent recoveries of spiked samples. Accuracy for the various analytical processes will be estimated using the recovery of the matrix spiking analytes from MS/MSD samples, other sample spikes as required by the methods, and/or by the analysis of standard reference materials (SRMs). The Federal Register includes calculations for accuracy on spiked samples for several organics methods. The same calculation may be used for any test amenable to spiking:

$$P = 100(A - B)/T$$

Where: P = Percent spike recovery
A = Concentration determined on spiked sample
B = Concentration determined on original unspiked sample
T = True value of spike added

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte. The data will be reported showing the laboratory MDLs. If a matrix interference or some other analytical problem prevents the attainment of the MDLs, the laboratory Quality Assurance Officer must be immediately notified. The Laboratory QA Officer will evaluate the problem and contact the project QA Officer for guidance, if necessary.

Analytical results for this project will be reported in the normal turnaround time of 25 business days. Expedited turnaround times are not necessary for the intended use of the data.

Representativeness and comparability of the data will derive from the application of standard, approved methods for sampling and analysis and, therefore, might be called into question in instances where deviations from these methods are required or where inconsistent comparisons of blanks and samples indicate suspect results.

Completeness of the data sets will be judged based upon the usability of the data for the purposes described. The sampling programs have been designed robustly so that up to 10 percent of the results are potentially expendable. However, certain data locations and constituents may be considered critical in combination with others if missing simultaneously. Therefore, each data set will be considered independently and, in the case of periodic events for the Lagoon Post-Closure monitoring, relative to previous sampling events, to determine whether it completely achieves project objectives. If critical deficiencies occur, additional samples will be collected.

All indicator field measurements are non-critical data.

8.0 Inspection/Acceptance Requirements for Supplies and Consumables

For this project, critical supplies will be tracked in the following manner.

Critical Supplies and Consumables	Inspection Requirements and Acceptance Criteria	Responsible Individual
Sample containers and lids	Visually inspected upon receipt for cracks, breakage, and cleanliness. Must be accompanied by certificate of analysis.	Field Team Leader
Field measurement equipment	Functional checks to ensure proper calibration and operating capacity	Field Team Leader
Sampling equipment	Visually inspected for obvious defects, damage, and contamination	Field Team Leader

Supplies and consumables not meeting acceptance criteria will initiate the appropriate corrective action. Corrective measures may include repair or replacement of measurement equipment, and/or notification of vendor and subsequent replacement of defective or inappropriate materials. All actions will be documented in the project files.

9.0 Sampling Procedures and Requirements

The additional groundwater, surface water, sediment, Equalization Lagoon Post-Closure Monitoring, Chrome Plating Line Area Monitoring, and Geoprobe® samples will be collected by the methods and procedures in the following sections. Field sampling forms will be completed for each sampling event. Copies of the field sampling forms are included in Appendix B.

9.1 Groundwater Sampling

Each of the wells for (1) the Corrective Measures Sampling, (2) the Equalization Lagoon Post-Closure monitoring, and (3) the Chrome Plating Line Area will be sampled according to the following procedures:

- The depth to static water level and the total depth will be measured in the well using a hand-held electric water level indicator.

- The volume of standing water in the 2-inch diameter well will be calculated using the following formula:

  $V = 0.164h$

  where:

  V = volume of water (in gallons)
  h = length of water column (in feet)

- A submersible pump, peristaltic pump, or a dedicated/disposable Teflon® bailer will be used to purge a minimum of three standing well volumes from the well prior to sample collection. Purged water will be measured for pH, temperature, oxidation-reduction potential (ORP) and specific conductance to ensure that relatively stable values (i.e., values within 10 percent of previous readings) for these parameters have been achieved prior to sampling. (ORP is not required for the Equalization Lagoon Post-Closure monitoring.)

- If the well is purged to dryness, it will be allowed to recharge. Care will be taken not to agitate the standing well water. In addition, water will be extracted from the upper half of the standing well water while sampling in order to both ensure that representative formation water is being collected and to prevent disturbance of sediment which may be present in the well.

- When the aforementioned criteria have been satisfied, groundwater samples will be collected in the appropriate, properly labeled sample containers. VOC samples will be collected using dedicated/disposal Teflon® bailers whereas other parameters will be sampled using the submersible pump.

- The samples will be kept on ice immediately upon collection and thereafter during shipment to the laboratory and until analyses are performed. The samples will be shipped using proper chain-of-custody procedures (see Section 10.4).

- Extremely low-flow sampling methods are necessary for the wells located inside the PRB due to the high hydraulic conductivity of the iron/sand media. Diffusion bag samplers will be used to collect VOC samples from these wells. These samplers will be installed in each of the wells at least two weeks prior to sample collection to allow the water in the samplers to equilibrate with the groundwater. The VOC sample vials will be filled directly from the samplers.

- An alternate groundwater sampling technique called Low Flow/Low Stress Sampling Technique may be followed for the closed Equalization Lagoon and Chrome Plating Line Area Sampling. Groundwater monitoring wells will be initially purged using a low-flow/low-stress technique prior to collecting a groundwater sample. This technique will consist of slowly lowering dedicated tubing connected to a peristaltic pump into a region of adequate permeability within the screened portion of the water-bearing zone, based on the well-specific and local hydrogeology. The specific depth of sampling for each well will be recorded in the logbook and will be used in all future sampling events to maintain consistency. Purging will commence at a low flow rate and will be adjusted such that the static water level remains constant during the purging and sampling process (e.g., discharge equals recharge). Equilibrium is dependent upon the stabilization of field parameters (pH, temperature, and specific conductivity). In addition, turbidity will be measured qualitatively to assure that extracted groundwater is relatively clear prior to sampling. Being sure to maintain the stabilized water level, purging will continue until water quality parameters have stabilized (pH ± 0.04, temperature ± 0.1° C, conductivity ± 5%, and clear appearance). Once field parameters have stabilized, a groundwater sample will be collected directly from the discharge stream into a laboratory-supplied sample container. Groundwater samples to be analyzed for volatile analysis will be collected from water in the influent tubing (e.g., prior to entering the pump rotor head assembly) in order to avoid concerns for volatilization inherent to the pumping mechanism (suction lift technique). New tubing will be used for each well, thereby eliminating decontamination requirements. Sample collection and handling procedures previously described will be followed.

A portion of the groundwater collected during the sampling procedures will be field tested for temperature, specific conductance, ORP, and pH.

Temperature will be measured first using a thermometer accurate to the tenth of a degree and the value recorded in the field logbook. The thermometer will be rinsed with deionized water and stored in a plastic carrying case for transport to other sampling locations.

The specific conductance and ORP will be measured using a probe that is field calibrated. The probe will be placed in the sample, readings obtained, and then the value recorded in the field logbook. The probe will be decontaminated between samples with a deionized water rinse and placed in a field carrying case.

The pH will be measured with a pH meter that is field calibrated to standards with pH values of 4.0, 7.0, and 10.0. The clean probe will be inserted into the sample container, the reading recorded in the field log book to the nearest 0.1 pH unit, and the probe rinsed with deionized water and inserted into its carrying case.

The probes will be calibrated daily prior to sampling events. Calibration will be conducted according to manufacturer's specifications.

9.1.1 Special Sampling Procedures for the Corrective Measures Sampling

In addition to temperature, pH, ORP, and conductivity, field analyses for the Corrective Measures Sampling will also involve the use of field kits to measure carbon dioxide, iron (II), manganese (II), hydrogen sulfide, and dissolved oxygen. The procedures for each of these field analyses vary and will be performed in accordance with the associated operating manuals from the manufacturer (see Appendix A).

During each sampling event, the samples will be accompanied by duplicate samples, equipment blanks, and trip blanks (as described in Table 6-3) to be analyzed for quality assurance/quality control (QA/QC). Procedures for collection of these samples are as follows.

Duplicate samples will be collected at the same time and location as field samples. Duplicates will be evenly split from the same bailer load and equally proportioned into each receptacle for the split duplicate. Sample containers will be labeled such that laboratory personnel are not aware that they are analyzing duplicate samples.

Equipment blanks are intended to assess the potential introduction of contamination during sample collection, handling, and analysis and will be obtained in a fashion that approximates sampling procedures used in the field. Distilled/deionized water will be poured into randomly selected clean bailers or pumps that are used for monitoring well sampling and collected in the appropriate containers for the specified analysis. The samples will be handled and transported as are other groundwater samples.

Trip blanks are used to assess contamination caused by sample handling, transportation, storage, and shipping procedures. Trip blanks will be prepared by the laboratory by placing distilled/deionized water into appropriate sample containers, transporting them to the field, and handling them in the same manner as other samples collected during daily field sampling operations.

The types of containers, preservation methods, and holding times for the various laboratory analyses are prescribed by the laboratory in accordance with USEPA methods and are presented in Section 10.2 and Table 10-1. Holding times will be measured from the time of sample collection.

Sample labels will be placed on all samples and will contain the following information:

- date and time of sample collection
- sample location

- sample number
- analysis to be performed
- sampler's name

The field logbooks used during sampling procedures will include the following information:

- date and time
- sampling location
- static water level (depth to water)
- depth to bottom of the well
- calculated well volume
- actual evacuation volume and time
- analyses to be performed
- preservation method
- field meter calibration information
- general remarks (weather conditions, etc.).

All entries will be made in indelible ink with a ballpoint pen and will be written legibly. Entry errors will be crossed out with a single line, dated, and initialed by the person making the correction. Field logbooks will be reviewed periodically by the Task Manager, as appropriate.

A chain-of-custody form will be completed after sample collection and master field log documentation. The chain-of-custody forms will accompany the samples to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until transportation to the laboratory. Sample transfer will require the individuals relinquishing and receiving the samples to sign, date, and note the time on the chain-of-custody forms.

9.2 Surface Water Sampling

Surface water samples will be collected near the east bank of Riverdale Creek in an area exhibiting the greatest degree of homogeneity. Surface water samples will be collected from downstream to upstream. Care will be taken not to disturb the sediment. At each of the sample locations, a water sample will be collected that is representative of the depth of water. This may be accomplished in one of two ways. If the water is deeper than 24 inches, a Kemmerer sampler will be used to collect a water sample of the water column or from approximate mid-depth location. If the water is less than 24 inches, a dipper will be used to collect the sample. In both instances, care will be taken not to disturb the sediment. At each sample location, a small amount of water will be collected in a sample cup for field pH, ORP, and conductivity testing. Prior to sample collection, the sample and sample cup will be flushed with the water at the sample location.

9.3 Sediment Sampling

Sediment samples will be collected as grab samples, using dedicated long-handled stainless steel spoons. The collected sediment will be placed into a dedicated Pyrex ® pan and mixed with a spoon. The sample will be placed into the appropriate, properly labeled sample containers. **It should be noted that sediment samples for VOC analysis will not be mixed prior to**

placement into the sample containers to avoid volatilization. All sampling equipment will be dedicated and decontaminated prior to sampling in accordance with USEPA established protocols. In the event that surface water and sediment sampling events coincide, surface water samples will be collected prior to sediment samples. In addition, samples will be collected from downstream to upstream.

9.4 Direct-Push Groundwater and Soil Sampling

Groundwater sampling using direct-push technology such as Geoprobe® may be conducted to provide additional data to supplement the Corrective Measures. Either temporary piezometers or the use of a direct-push sampler will be used to collect groundwater samples.

One-inch piezometers may be installed at specified locations. The piezometers will be installed using direct-push methods within either the upper portion of the water table aquifer (approximately 25 feet below ground surface) or lower portion of the aquifer (approximately 45 to 50 feet below ground surface). Piezometers may be completed with a 4-inch diameter locking steel protective casing and surveyed for horizontal and vertical control in order to keep the integrity of the piezometer for the purposes of collecting groundwater elevation measurements and initial groundwater quality.

Groundwater samples may be collected with a direct-push sampler. The decontaminated sampler will be driven to the desired sampling depth. The sampler barrel will be retracted to expose the sampler screen allowing groundwater to flow into the sampler. A peristaltic pump with tygon tubing will be used to purge approximately three sampler volumes. Once the sampler has been purged, a groundwater sample will be collected through the pump in 40-ml containers for VOC analysis. The samples will be handled and labeled in accordance with the groundwater sampling section.

In addition to the groundwater samples, trip blanks, duplicate sample, and an equipment blank will be collected for quality assurance/quality control (QA/QC) in accordance with Table 6-3.

All purge water developed during the sampling event will be placed into 55-gallon drums and stored on Site. The results of the groundwater analyses will be used to characterize the purge water for proper disposal by ArvinMeritor.

Soil cores will be collected to determine the elevation of the top of the aquitard. A direct-push soil sampler will be used to collect continuous soil cores from the surface to the top of the aquitard. Each soil core will be visually inspected and the geologic materials logged in the field notebook, specifically noting the depth to which the aquitard was encountered.

9.5 Sludge Sampling

Sludge will be removed from the lagoon using a hydraulic excavator. From the excavator bucket, sludge will be collected using dedicated sampling equipment to reduce cross-contamination. Sampling equipment may include, but is not limited to, one-inch plastic sleeves, sleeve cutter, nitrile gloves, container to mix discrete samples into a composite, and a mixing tool. Sludge

samples will be collected at discrete locations and mixed for composite samples, as will be described in the associated work plan.

9.6 Air Sampling

Composite air samples will be collected in six-liter summa canisters fitted with a time integrated flow controller set for continuous air collection for eight hours. Air sample locations will be identical to the three previous sampling events (see Figure 6-3). Sampling procedures will be conducted in accordance to the methods outlined in previous indoor air monitoring reports.

9.7 Decontamination

An important aspect of quality control is the decontamination of field equipment. Improperly cleaned equipment can lead to cross-contamination and misinterpretation of data. Decontamination procedures for this project are outlined in the following paragraphs.

Water Level Indicators

Upon completion of the liquid measurements in the monitoring wells, the probe will be raised to the surface and along with the wetted portion of the tape will be decontaminated with the following procedure:

- Wash in potable water and laboratory detergent
- Rinse with potable water
- Rinse with distilled/deionized water

For wells that are located around the perimeter of the Site and which are expected to contain relatively low concentrations of dissolved contaminants with respect to historical data, only the last two steps will be performed.

Submersible Sampling Pumps

Submersible pumps will be cleaned prior to and between each use. Pump tubing will be discarded after each use.

The cleaning process will consist of the following:

- The external surface will be scrubbed with a potable water/detergent solution.
- Flush laboratory detergent and potable water solution through the pump.
- Rinse the external surface of the pump.
- Flush two gallons of potable water through the pump.
- Rinse the internal and external surface of the pump with distilled/deionized water

The power leads to the pump will be decontaminated in a similar fashion.

Drilling and Excavating Equipment

All drilling equipment will be decontaminated before the onset of each boring using the following process:

- The external surfaces will be scrubbed with a potable water/detergent solution.
- Clean internal (if applicable) and external surfaces by high-pressure potable water washing.
- Rinse with potable water.

Miscellaneous Equipment

- Wash the external and internal surfaces with a potable water/detergent solution.
- Rinse with potable water.
- Rinse with distilled/deionized water.

10.0 Sample Handling, Tracking, and Custody Requirements

10.1 Sample Collection Documentation

The field logbooks used during sampling procedures will include the following information as appropriate for the type of sampling (i.e., groundwater, soil, or sludge).

- date and time
- sampling location
- static water level (depth to water)
- depth to bottom of the well
- calculated well volume
- actual evacuation volume and time
- analyses to be performed
- preservation method
- field meter calibration information
- general remarks (weather conditions, etc.).

All entries will be made in indelible ink with a ballpoint pen and will be written legibly. Entry errors will be crossed out with a single line, dated, and initialed by the person making the correction. Field logbooks will be reviewed periodically by the Task Manager, as appropriate. Additionally, a field sampling data sheet (see Appendix A) will be completed for each sample.

10.2 Sample Preservation, Container Specification, and Holding Time Requirements

The sample container, volume and preservation table and sample naming conventions are provided in the following sections. Table 10-1 presents the sample preservation, container specification, and holding time requirements.

Table 10-1 Sample Preservation, Container Specification, and Holding Time Requirements

Matrix	Parameter/ Method	Sample Container(s)	Recommended Sample Size	Preservative	Holding Time
Water	Metals/Mercury 6010B/7470A	Plastic	1000 ml	Cool, 4°C; Nitric acid to pH≤2	180 days all except Mercury/28 days for Mercury
	VOC/8260	VOC Vials-(3) No Headspace	40 ml	Cool, 4°C;HCl to pH≤2	14 days
	SVOC/8270	Glass amber 2 per location	1000 ml	Cool, 4°C	7 days extraction 40 days analysis
	Hexavalent Chromium/7196A	Plastic	500 ml	Cool, 4°C	24 hrs.
	Chloride/9251/300.0	Glass	120 ml	Cool, 4°C	28 days

Matrix	Parameter/ Method	Sample Container(s)	Recommended Sample Size	Preservative	Holding Time
	Nitrate/nitrite/ 353.2	Glass	120 ml	Cool, 4°C;Sulfuric acid	28 days
	Sulfate/9038/300.0	Plastic/Glass	500 ml	Cool, 4°C	28 days
	Ethane, ethane, methane/RSK	Glass vials (3)	40 ml	Cool, 4°C	
	Volatile Fatty Acids/5560C	Glass	1000 ml	Cool, 4°C	14 days
	Dissolved total organic carbon (TOC)/415.2	Plastic/Glass	120 ml	Cool, 4°C; Sulfuric acid	28 days
	Alkalinity (carbonate/bicarbonate)/2320	Plastic/Glass	500 ml	Cool, 4°C	14 days
Soil/ Sediment/ Sludge	VOC/ 5030B/ 8260B	Glass	2 oz	Cool, 4°C	14 days
	Metals/Mercury 6010B/7471	Glass	2 oz	Cool, 4°C	180 days all except Mercury/28 days for Mercury
	Hexavalent Chromium/7196A	Glass	2 oz	Cool, 4°C	28 days
	SVOC/8270C	Glass	8 oz	Cool, 4°C	14 days
	pH/9045B	Glass	8 oz	Cool, 4°C	On-site
	Sulfide/376.1	Glass	8 oz	Cool, 4°C	7 days
	Sulfate/300.0	Glass	8 oz	Cool, 4°C	28 days
	Sulfite/377.1	Glass	8 oz	Cool, 4°C	On-site
	TOC/Mod.9060	Glass	8 oz	Cool, 4°C	28 days
	Oil and grease/Mod.1664A	Glass	8 oz	Cool, 4°C	28 days
	TCLP metals/6010B/7470	Glass	16 oz	Cool, 4°C	6 months
	TCLP VOCs/8260B	Glass	4 oz	Cool, 4°C	14 days
	TCLP SVOCs/8270C	Glass	16 oz	Cool, 4°C	14 days
	Nitrite/nitrate/ 353.2	Glass	8 oz	Cool, 4°C	28 days
	Cyanide/9012A	Glass	8 oz	Cool, 4°C	14 days
	Ammonia/350	Glass	4 oz	Cool, 4°C	28 days
Air	VOC/TO-15	Steel Summa Canister	6 L	None.	30 days

Sample prefixes will be named as follows:

- Direct-push (Geoprobe®) - - GP to indicate Geoprobe® boring followed by a number. In the case that there are existing borings, an attempt will be made to build upon these numbers consecutively.
- Monitoring wells - - MW to indicate monitoring well followed by a number. Additional monitoring wells at the Site will be labeled in ascending order starting with the last monitoring well installed at the Site.
- Surface water - - SW to indicate surface water followed by a number (9, 12, 17, 19, and 22) as shown in Figure 6-1.
- Sediment - - SD to indicate sediment followed by a number (4, 7, 9, 12, and 17). as shown in Figure 6-1.

- Soil - - SB to indicate soil boring followed by a number and depth (i.e., SB-1 0-1).

10.3 Sample Chain-of-Custody

A chain-of-custody (COC) form will be completed after sample collection and master field log documentation. The chain-of-custody forms will accompany the samples to the laboratory. The field personnel collecting the samples will be responsible for the custody of the samples until transportation to the laboratory. Sample transfer will require the individuals relinquishing and receiving the samples to sign, date, and note the time on the chain-of-custody forms.

10.4 Laboratory Chain-of-Custody Procedures

Laboratory custody procedures for sample receiving and log-in; sample storage; tracking during sample preparation and analysis; and storage of data are described in the laboratory standard operating procedures (SOPs) and laboratory Quality Manuals. A summary of the process is described below.

On arrival at the laboratory, all samples will be inspected thoroughly to confirm that the integrity of the samples and containers has not been compromised. The cooler custody seals will be inspected to verify that they are still intact and were properly signed and dated by the field sampling team. The temperature of the cooler temperature blank will be determined and recorded. If the temperature of the cooler blank does not fall into the range of 4±2 °C (not applicable to air samples) the Project Manager will be notified immediately. The exception to this will be if samples are delivered from the Site same-day to the laboratory. In this circumstance the cooler temperature blank and samples may not have cooled during transport and elevated temperatures will be considered acceptable as long as ice is present in the cooler. The individual sample containers will be inspected to verify that each has a sample label. The condition of the samples will be noted on the COC form.

The sample containers will be checked against the accompanying COC to verify that the cooler contents are identical to the samples described on the COC documents. If discrepancies exist, they will be reported to the Laboratory Project Manager, who will immediately notify the Project Manager. The problem will be resolved, in writing, before analytical work begins.

After the Laboratory Sample Custodian has determined that the samples are in satisfactory condition and the documents are in order, a sample log-in sheet will be initiated and will serve as documentation of the condition of the samples upon receipt and their assigned laboratory numbers.

After the samples have been entered into the laboratory tracking system, copies of the log-in forms and COC records will be sent to the Project Manager, who will verify that the specified samples and parameters correspond to the samples and parameters identified in the QAPP. The samples will be placed in a secured storage area, under the conditions called for by the analytical method, until removed for analysis.

Samples delivered on Saturday will be received by the Laboratory Sample Custodian and placed in a secure location until they can be logged in on the next business day.

10.5 Sample Archival

Samples and sample extracts for all analyses will be held under custody at 4±2 °C (except for air samples) by the laboratory for 60 days after the laboratory's final report is issued.

11.0 Field Analytical Methods

Conductivity, temperature, pH, and ORP meters will be used to collect field measurements. Several other non-critical indicator measurements (carbon dioxide, iron (II), manganese (II), hydrogen sulfide, and dissolved oxygen) will be made in the field as well. The methods and procedures for these measurements are presented in Appendix A.

12.0 Laboratory Analytical Method Requirements

Table 12-1 describes the tests to be performed on the samples collected during these monitoring programs.

Table 12-1 Tests and Methods for the Monitoring Program

Test	Matrix	SW-846 Method	Laboratory
Metals (including Mercury and Hexavalent Chromium)	Groundwater/Surface Water	6010B/7196A/7470A	Empirical Laboratories, LLC
VOCs	Groundwater/Surface Water	8260B	Empirical Laboratories, LLC
SVOCs	Groundwater/Surface Water	8270C	Empirical Laboratories, LLC
Metals (including Mercury and Hexavalent Chromium)	Soil/Sediment/Sludge	3005A/6010B/7196A /7470A	Empirical Laboratories, LLC
VOCs	Soil/Sediment/Sludge	5030B/8260B	Empirical Laboratories, LLC
SVOCs	Soil/Sediment/Sludge	8270C	Empirical Laboratories, LLC
TCLP Metals	Soil/Sediment/Sludge	6010B/7470	Empirical Laboratories, LLC
TCLP VOCs	Soil/Sediment/Sludge	8260B	Empirical Laboratories, LLC
TCLP SVOCs	Soil/Sediment/Sludge	8270C	Empirical Laboratories, LLC
pH	Soil/Sediment/Sludge	9045B	Empirical Laboratories, LLC
Sulfide	Soil/Sediment/Sludge	376.1	Empirical Laboratories, LLC
Sulfate	Soil/Sediment/Sludge	300.0	Empirical Laboratories, LLC
Sulfite	Soil/Sediment/Sludge	377.1	Empirical Laboratories, LLC
TOC	Soil/Sediment/Sludge	Modified 9060	Empirical Laboratories, LLC
Oil and grease	Soil/Sediment/Sludge	1664A	Empirical Laboratories, LLC
Nitrate/nitrite	Soil/Sediment/Sludge	300.0/353 2	Empirical Laboratories, LLC
Cyanide	Soil/Sediment/Sludge	9012A	Empirical Laboratories, LLC
Ammonia	Soil/Sediment/Sludge	350.1	Empirical Laboratories, LLC

Tables 6-2a and 6-2b of this QAPP set forth the analytes required for each method. These tables also present the required extraction and clean-up method for each analyte.

All instruments used to perform chemical measurements must be properly calibrated prior to and during use to ensure acceptable and valid results. This section describes the procedures necessary for maintaining the accuracy of all the instrumentation used in the field tests and the laboratory analyses. The accuracy and traceability of all calibration standards used must be properly documented. The procedures described herein are to be used in conjunction with specific instrument manufacturer's instructions, applicable analytical methodology requirements, and specific laboratory/field procedures for instrument operation.

The required turn-around time for this project is 25 business days.

12.1 Laboratory Instruments

The methodologies selected for use in this investigation specify the types and frequency of calibrations. For all analytical procedures, the lowest calibration standard analyzed must be at or below the project required reporting limit for the specific medium being tested to ensure accurate reporting limit determinations.

Other laboratory equipment such as refrigerators, balances and ovens required for the storage and preparation of samples must be calibrated and/or monitored with the following guidelines.

- Equipment must be checked daily and these records kept in a logbook or calibration-specific log
- The laboratory must document clearly the acceptance criteria for all such equipment (e.g., refrigerator temperature must be 4°C ± 2°C, not applicable to air samples) and corrective actions must be taken for any out-of-control situation as described in the laboratory's Quality Manual
- The equipment must not be used after corrective action until it has been recalibrated or verified through the successful analysis of a check standard
- Calibrations of other miscellaneous analytical equipment (e.g., automatic pipettes) must be performed according to manufacturer's recommendations

Implementation of the laboratory calibrations will be the responsibility of the Laboratory Manager and the analysts performing the procedures.

12.2 Laboratory Instrument Preventative Maintenance

As part of the laboratory's Quality Manual, a routine preventative maintenance program is conducted by the laboratory to minimize the occurrence of instrument failure and other system malfunctions. Designated laboratory employees regularly perform routine scheduled maintenance and repair of (or coordinate with the vendor for the repair of) all instruments. All laboratory instruments are maintained in accordance with manufacturer's specifications. The preventive maintenance program should include:

- An inventory of replacement and spare parts for instruments that are maintained.
- Maintenance logbooks for each instrument with information on routine and non-routine procedures. The logbook records must include the instrument number, description of malfunction or problem, date of maintenance activity, the type of activity performed, and final resolution.
- Training of laboratory staff in the maintenance requirements of the instruments. Preventive maintenance schedules and activities will be outlined in the laboratory SOPs.

12.2.1 Inductively Coupled Plasma Spectroscopy

The Inductively Coupled Plasma Argon (ICP) Spectrometer should be maintained under service contract with the manufacturer. Routine preventive maintenance should include:

- Checking pump tubing and replacing when necessary.
- Checking nebulizer for even "spray" and cleaning as necessary.
- Checking the torch for plasma height and shape and cleaning as necessary.
- Checking sensitivity of photomultiplier and replacing as necessary.

12.2.2 Gas Chromatograph (GC) and Mass Spectrometry (MS) Instruments

The GC and GC/MS systems will be maintained on a service contract or undergo in-house maintenance to provide routine preventive maintenance. Spare parts for the GC and GC/MS systems should include: filaments, electron multiplier, source parts, o-rings, ferrules, septa, injection port liners, and columns. Routine preventive maintenance for the systems should include:

- Checking the data systems (disk drives, tape readers, etc.) and servicing, as necessary.
- Changing oil and traps on mechanical and turbo pumps.
- Conditioning of moisture traps, every two months or when the gas source is changed
- Carrier gas evaluation and leak checking of electron capture detector when the gas or column is changed.
- Servicing the MSS source through cleaning, replacement of filaments and other source parts, as necessary.
- Replacement of injection port septa and liners, as necessary.
- Clipping the front end of GC column or replacement of GC column, as necessary.

12.2.3 Atomic Absorption Instruments

The atomic absorption (AA) systems will be maintained on a service contract or undergo in-house maintenance to provide routine preventive maintenance. Routine preventive maintenance procedures should include:

- Cleaning the furnace windows.
- Checking the plumbing connections.
- Changing the graphite tube.
- Checking the gases.
- Checking the autosampler and tubing.

12.2.4 Thermometers

Thermometers for refrigerators and ovens are calibrated yearly against National Institute of Standards and Technology (NIST) certified thermometers. The Laboratory QA Officer will be responsible for the safekeeping of the NIST thermometers and for the documentation asserting the accuracy of their measurements.

12.2.5 Analytical Balances

Virtually every analytical procedure requires the use of side-loading and/or top-loading balances. Many of these requirements involve standards preparation and are, therefore, crucial to accurate determination. Balances should be maintained on a service contract. A calibration status label is affixed to each balance after calibration during servicing.

12.3 Inspection/Acceptance Requirements for Supplies and Consumables

For this project, critical supplies will be tracked in the following manner.

Critical Supplies and Consumables	Inspection Requirements and Acceptance Criteria	Responsible Individual
Sample containers/lids	Visually inspected upon receipt for cracks, breakage, and cleanliness. Must be accompanied by certificate of analysis.	Requisitioner
Chemicals and reagents	Visually inspected for proper labeling, expiration dates, and appropriate grade. Standards must be accompanied by certificate of analysis.	Requisitioner
General Supplies and spare parts	Visually inspected to ensure that the correct items were received in working or usable condition.	Requisitioner

Supplies and consumables not meeting acceptance criteria will initiate the appropriate corrective action. Corrective measures may include repair or replacement of measurement equipment, and/or notification of vendor and subsequent replacement of defective or inappropriate materials. All actions should be documented in the project files.

13.0 Quality Control Requirements

13.1 Sampling Quality Control

Table 13-1 Field Sampling QC for VOCs, SVOCs, and Metals

Field QC:	Frequency	Method/SOP Acceptance Limits	Corrective Action (CA)	Persons Responsible for CA	Data Quality Indicator	Measurement Performance Criteria
Field Blank[1]	1 per medium per 20 field samples collected, or 1 per medium per event if fewer than 20 samples collected.	All compounds of interest ≤ RL	Qualify data	Task Manager	Evaluate cleanliness of sample containers and sample handling and collection procedures	All compounds of interest ≤ RL
Cooler* Temperature Blanks	One per cooler.	4± 2°C	Qualify data. Reject data or resample for excessively high temps[2]	QA Coordinator/ Project Manager	Evaluate representativeness and bias	4± 2°C
Field Duplicate[3]	1 per medium per 20 field samples, or 1 per medium per event if fewer than 20 samples collected.	±50% RPD with provisions for wider acceptance limits near the detection limits	Compare to matrix duplicates, check for possible matrix interferences or improper sample collection procedure, qualify data	QA Officer	Evaluate precision and representativeness taking into account variability of sample matrix	±50% RPD with provisions for wider acceptance limits near the detection limits
Matrix spike/ matrix spike duplicate	1 per 20 field samples will be designated for MS/MSD analysis and additional samples volume will be provided for the test.	±50% RPD with provisions for wider acceptance limits near the detection limits	Check for possible matrix interferences, review laboratory procedures for variations or improper sample collection procedure, qualify data	Laboratory Analyst/ QA Officer	Evaluate precision and representativeness taking into account variability of sample matrix and laboratory practices.	±50% RPD with provisions for wider acceptance limits near the detection limits

1. Field blanks are prepared by collecting sample from new building materials with dedicated sampling equipment.
2. The exception to this will be if samples are delivered from the Site same day to the laboratory. In this circumstance the cooler temperature blank and samples may not have cooled during transport and elevated temperatures will be considered acceptable as long as ice is present in the cooler.
3. A field duplicate is a split sample with both portions sent to the same lab.
4. A field laboratory split is a split sample with the portions sent to different labs.

* Not applicable to air samples.

13.2 Analytical Laboratory Quality Control

Table 13-2 Laboratory Sample QC Table for VOCs, SVOCs, and Metals

Type	Frequency	Criteria	Corrective Action (CA)	Person Responsible for CA	Data Quality Indicator	Measurement Performance Criteria
Method Blank	Minimum of 1 per analytical batch or per 20 field samples; whichever is less	All compounds of interest < RL	Reanalyze; if blank still exceeds criteria, clean and recalibrate system; document corrective action, evaluate/reprepare/ reanalyze samples	Laboratory Analyst/Area Manager	Evaluate cleanliness of sample preparation and analysis procedures	All compounds of interest should be < RL
Instrument Blank	As required in method	All compounds of interest < RL	Reanalyze; if second blank exceeds criteria, clean system; document corrective action	Laboratory Analyst	Evaluate cleanliness of instrumentation	All compounds of interest should be < RL
Matrix Spike	At least 1 per preparation batch or as requested on COC	Meet %R requirements in Tables 7-2 and 7-3	Reanalyze samples if necessary. Qualify data if criteria are still not met.	Laboratory Analyst/Area Manager	Evaluate accuracy and representativeness taking into account variability of sample matrix	Meet %R requirements in Tables 7-2 and 7-3
Matrix Spike Duplicates (except metals)	At least 1 per preparation batch or as requested on COC	Meet %R requirements in Tables 7-2 and 7-3	Reanalyze samples if necessary. Qualify data if criteria are still not met.	Laboratory Analyst/Area Manager	Evaluate precision, accuracy, and representativeness taking into account variability of sample matrix	Meet %R requirements in Tables 7-2 and 7-3
Laboratory Duplicate (metals only)	At least 1 per preparation batch or as requested on COC	Meet RPD requirements in Tables 7-2 and 7-3	Reanalyze samples. Qualify data if criteria are still not met.	Laboratory Analyst/Area Manager	Evaluate precision and representativeness taking into account variability of sample matrix	Meet RPD requirements in Tables 7-2 and 7-3
LCS	1 per medium per 20 field samples or per laboratory sample batch, whichever is less	Lab/regulatory generated: recoveries as specified in Tables 7-2 and 7-3	Check if MS/MSD acceptable to compare for matrix effects. Evaluate the bias in relation to sample result. Reanalysis may be required. Data may require qualifiers.	Laboratory Analyst/Area Manager	Evaluate accuracy	Vendor-supplied: Within the 95% confidence interval/ vendor supplied limits Lab-generated: recoveries as specified in Tables 7-2 and 7-3
Initial Calibration	As specified in method	As specified in methods	Recalibrate; check system	Laboratory Analyst	Establish instrument response and linearity	As specified in methods

Table 13-2 Laboratory Sample QC Table for VOCs, SVOCs and Metals (Continued)

Type	Frequency	Criteria	Corrective Action (CA)	Person Responsible for CA	Data Quality Indicator	Measurement Performance Criteria
Calibration Check Sample	As specified in method	90-110% recovery for most inorganics; as specified in EPA methods for organics listed in Tables 7-2 and 7-3	Recalibrate; check system, reanalyze affected samples	Laboratory Analyst	Evaluate stability and accuracy of instrumentation.	90-110% recovery for most inorganics; as specified in EPA methods for organics listed in Table 7-2 and 7-3
Surrogates	All GC/MS and GC samples for organic analyses	Recoveries as specified in Table s 7-2 and 7-3	Evaluate data; samples may require reanalysis and/or qualification	Laboratory Analyst/ Area Manager	Evaluate accuracy of sample preparation and effect of matrix on preparation	Recoveries as specified in Table s 7-2 and 7-3

RL = Reporting Limit
MS = Matrix Spike Sample
MSD = Matrix Spike Duplicate Sample
MD = Matrix Duplicate Sample
SRM = Standard Reference Material
LCS = Laboratory Control Sample
RPD = Relative Percent Difference (between duplicate results)
GC = Gas Chromatography
GC/MS = Gas Chromatography/Mass Spectrometry

14.0 Documentation, Records, and Data Management

14.1 Project Documentation and Records

Project documents will be controlled through an organized project filing system. Project and task numbers will be printed on each document. Analytical/technical files will include work products generated during the project. Field books, field observations, photographs, and other field related documents will be prepared and will also be placed in the project files. Laboratory sample results will be controlled, reviewed, and validated. Original incoming documents will be date-stamped upon arrival and will be placed in the files.

The project manager will contact the analytical laboratories, subcontractor, or other private sources prior to receiving the data report to review the report status. This will provide an opportunity to identify potential QA issues or potential delivery delays. This will also provide an opportunity to implement corrective actions when most appropriate.

Data received from the field, analytical laboratories, subcontractors, or private sources will be tabulated on a spreadsheet or database and will be subjected to quality control procedures, including comparing raw data to the original source, verifying calculations, and confirming data summaries. Data distribution will not occur until data review has been completed.

Work products will be checked before final issuance. This includes checking calculations, reports, plans, etc. with various levels of review. The Project Manager will be responsible for the review of work as an element of his project responsibilities. The Monitoring Manager is responsible for the overall quality of the work. One or more discipline-specific Technical Directors may be assigned by the Project Manager. Further, assignments may be made outside the project team, as needed, for quality control purposes; for example, utilizing personnel experienced in the monitoring and evaluation of natural attenuation data.

14.2 Laboratory Data Package Deliverables

CLP package deliverables will be required for the Corrective Measures Sampling and Monitoring project. It will not be required for the Equalization Lagoon and Chrome Plating Area sampling and monitoring. The laboratory will provide at least two hard-copies of each laboratory data report, an original and a copy for data validation, to the Project Manager. Electronic deliverables will also be required for the project database. Laboratory deliverables are required within 30 days of receiving samples.

14.2.1 Hardcopy Data Package

The laboratory data reports for the Corrective Measures Sampling will include a full data package so that a thorough review of all QA/QC can be performed and any matrix or method issues be discovered and resolved. The data package shall consist of the following, at a minimum:

1. Detailed Case Narrative

- Date of issuance
- Laboratory analysis performed, modifications to the methods, and impact on the data.
- Any deviations from intended analytical strategy
- Laboratory batch number
- Numbers of samples and respective matrices
- QC procedures utilized and also references to the acceptance criteria
- Laboratory report contents
- Project name and number
- Condition of samples 'as-received'
- Discussion of whether or not sample holding times were met and if holding times were not met a demonstration of the validity of the data.
- Discussion of technical problems or other observations which may have created analytical difficulties
- Discussion of any laboratory QC checks which failed to meet project criteria and the effect on the data.
- Signature of the Laboratory QA Officer and/or Laboratory Director or designee.
- Description of laboratory data qualifiers used
- Definitions of acronyms and qualifiers.

2. Chemistry Data Package

- Report of analysis with units clearly labeled with supporting raw data and expressed to the appropriate number of significant figures.
- Results of method blanks with supporting raw data
- Summary table showing relationship field samples to QC samples
- Surrogate recovery summaries
- Laboratory control sample summary with supporting raw data
- Matrix spike summary with supporting raw data
- Laboratory duplicate summary with supporting raw data (where applicable)
- Matrix spike duplicate summary with supporting raw data (where applicable)
- Tune Summary (GC/MS)
- Initial calibration summary and supporting raw data
- Continuing calibration summary and supporting raw data
- Internal standard summary
- Instrument sensitivity check (CRI or equivalent)
- Interference Check Sample summary
- Run logs
- Sample preparation logs
- Laboratory method detection limits
- ICP linear ranges
- Laboratory acceptance limits for QC samples
- Internal and external chains of custody
- Sample raw data

Laboratory Data Packages for the long-term monitoring of the closed Equalization Lagoon and the Chrome Plating Line Area will include a summary data package which will include the following items at a minimum:

1. Detailed Case Narrative

- Date of issuance
- Laboratory analysis performed, modifications to the methods, and impact on the data.
- Any deviations from intended analytical strategy
- Laboratory batch number
- Numbers of samples and respective matrices
- QC procedures utilized and also references to the acceptance criteria
- Laboratory report contents
- Project name and number
- Condition of samples 'as-received'
- Discussion of whether or not sample holding times were met and if holding times were not met a demonstration of the validity of the data.
- Discussion of technical problems or other observations which may have created analytical difficulties
- Discussion of any laboratory QC checks which failed to meet project criteria and the effect on the data.
- Signature of the Laboratory QA Officer and/or Laboratory Director or designee
- Description of laboratory data qualifiers used
- Definitions of acronyms and qualifiers.

2. Chemistry Data Package

- Report of analysis with units clearly labeled and expressed to the appropriate number of significant figures.
- Results of method blanks
- Summary table showing relationship field samples to QC samples
- Surrogate recovery summaries
- Laboratory control sample summary
- Matrix spike summary
- Laboratory duplicate summary (where applicable)
- Matrix spike duplicate summary (where applicable)
- Internal standard summary
- Interference Check Sample summary
- Run logs
- Sample preparation logs
- Laboratory method detection limits
- ICP linear ranges
- Laboratory acceptance limits for QC samples
- Chain of custody records

14.3 Data Tracking, Storage, and Control

The final project files will be maintained by the Project Manager in a secured, limited access area. The content of the project file will include, at a minimum, all relevant records, reports, correspondence, logs, field logbooks, laboratory sample preparation and analysis raw data, original laboratory data packages, pictures, subcontractor's reports including data validation reports, assessment reports, progress reports, and COC records/forms.

15.0 Assessments and Response Actions

15.1 Planned Assessments

An internal audit of field activities including sampling and field observations will be conducted by the Task Manager early in the project to verify that all established procedures are being followed.

15.1.1 Data Package Technical Systems Audit

Assessment of the analytical information will be accomplished by the joint efforts of the QA Officer and Project Manager. The data assessment by the Project Manager will be based on the criteria that the samples were properly collected and handled according to the Sampling and Analysis Plan and Section 9 of this QAPP.

The QA Officer will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate, and blank results provided by the laboratory. An evaluation of data accuracy, precision, sensitivity, and completeness, based on criteria set forth in Section 7.0 of this QAPP, will be performed and included in the sampling event report.

The Data Review will identify any out-of-control data points and data omissions. The QA Officer will interact with the laboratory to correct data deficiencies. Decisions to repeat sample collection and analyses may be made by the Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.

15.2 Assessment Findings and Corrective Action Responses

Corrective action is the process of identifying, recommending, approving, and implementing measures to counter unacceptable procedures or out of QC performance which can affect data quality and usability. Corrective actions may be required for two classes of problems: analytical and equipment problems and noncompliance problems. Analytical and equipment problems may occur during sampling and sample handling, sample preparation, laboratory instrumental analysis, and data review.

For non-compliance problems (e.g., non-compliance with USEPA methods or QC defined in this QAPP) a formal corrective action will be implemented at the time the problem is identified. The person who identifies the problem is responsible for notifying the Project QA Officer. A description of the problem and the corrective action implemented will be confirmed in writing via email, facsimile, or technical memorandum.

Any non-conformances with the established QC procedures in this QAPP will be identified and corrected on an ongoing basis throughout the course of the project.

The need for corrective action may be identified at anytime during the analytical process. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. These actions are dependent upon the ability to mobilize the field team and whether the data to be collected is necessary to meet the required

QA objectives. If the QA Officer or data assessor identifies a corrective action situation, the Project Manager will be responsible for informing the appropriate personnel. All corrective actions of this type will be documented by the Project Manager.

15.3 Additional QAPP Non-Conformances

The purpose of this section is to indicate the methods by which it will be ensured that the data collected for this investigation falls in line with the DQOs as described in Section 7 of this QAPP. To meet these DQOs, a combination of statistical procedures and qualitative evaluations will be used to check the quality of the data. These procedures will be used by the laboratory while generating the data.

Results for QC samples, including field and laboratory blanks, spikes, and duplicates as previously described in Sections 7 and 13 of this QAPP, will be evaluated using the equations in the validation guidelines to determine the validity and usability of the data. In addition, the data will be reviewed for indications of interferences to results caused by sample matrices, contamination during sampling, contamination in the laboratory, and sample preservation and storage anomalies (i.e. sample holding time or analytical instrument problems).

15.3.1 Field Sampling

Technical staff and field project personnel will be responsible for reporting all suspected technical or QA non-conformance or suspected deficiencies of any field collection or observation activity by reporting the situation to the Project Manager or designee. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, then a non-conformance report will be initiated by the field personnel.

The QA Officer will be responsible for ensuring that corrective actions for non-conformance are initiated by:

- evaluating all reported non-conformances;
- controlling additional work on non-conforming items;
- determining disposition or action to be taken;
- maintaining a log of non-conformances;
- reviewing non-conformance reports and corrective actions taken; and
- ensuring non-conformance reports are included in the final Site documentation in project files.

Corrective actions will be implemented and documented in the field record book. Documentation will include:

- A description of the circumstances that initiated the corrective action,
- The action taken in response,
- The final resolution, and
- Any necessary approvals.

No staff member will initiate corrective action without prior communication of findings through the proper channels.

Corrective action resulting from internal field audits will be implemented immediately if data may be adversely affected due to unapproved or improper use of approved methods. The Project QA Officer will identify deficiencies and recommend corrective action to the Project Manager. Implementation of corrective actions will be performed by the Field Team Leader (FTL) and field team.

If appropriate, the Project Manager will ensure that no additional work that is dependent on the non-conforming activity is performed until the corrective actions are completed.

If a corrective action warrants a change in the program protocols, this change will be documented and signed by the FTL and the Project Manager.

15.3.2 Laboratory Analysis

The laboratories participating in this program are required to have a written policy specifying corrective actions to be taken when an analytical error is discovered or the analytical system is determined to be out of control. These policies require documentation of the corrective action and notification by the analyst about the errors and corrective procedures. Corrective action for each laboratory is described in the laboratory Quality Manual.

Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. The investigative action taken is dependent on the analysis and the event. Laboratory corrective actions may be necessary if:

- QC data are outside the acceptable windows for precision and accuracy
- Blanks contain compounds of interest, as listed in tables in Section 6 of this QAPP, above acceptable levels
- Undesirable trends are detected in matrix spike recoveries or RPD between duplicates
- There are unusual changes in detection limits
- Deficiencies are detected by the Laboratory QA Department during internal or external audits or from the results of performance evaluation samples
- Inquiries concerning data quality are received.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, and so on. If the problem persists or cannot be identified, the matter is referred to the laboratory supervisor, manager and/or QA department for further investigation. Once the problem is resolved, full documentation of the corrective action procedure is filed with the QA department.

Corrective action may include:

- Re-analyzing the samples, if holding time criteria permits;
- Re-sampling and analyzing;
- Evaluating and amending analytical procedures;
- Accepting data and acknowledging the level of uncertainty as documented in the laboratory data package case narrative.

If re-sampling is deemed necessary due to laboratory problems, the Project Manager will identify the necessary approach including cost recovery for the additional sampling effort.

16.0 QA Management Reports

The final report will contain QA sections in which data quality information collected during the project is summarized. The QA section of the report will contain information generated during the project on the achievement of project-specific DQOs, uncertainties in the data used and their effect on the data usage, and a summary of corrective actions implemented, as necessary, as it may have affected results.

17.0 Verification and Validation Requirements

A validation of the collected data will be conducted that includes a check of the field sample and COC records and a qualitative evaluation of the laboratory data. The laboratory data evaluation will address the use of appropriate analytical methods and analytical detection limits, positive detections in blanks, comparison of data to anticipated results, evaluation of qualified data, comparison to required holding times, and a comparison to respective duplicate samples.

18.0 Verification and Validation Procedures

18.1 Data Validation

18.1.1 Procedures Used to Validate Field Data

The procedures to evaluate field information include checking for transcription errors, ensuring that field measurement equipment was properly calibrated, and review of field logbooks. Historical data from previous Site assessments will be compared to the data generated during this assessment. These reviews will be performed by the Field Team Leader.

18.1.2 Procedures Used to Validate Laboratory Data

The data will be assessed for usability, completeness, and adherence to key QA/QC objectives for this project. For the Corrective Measure Sampling, this data assessment review will include a review of all technical holding times, instrument performance check sample results, initial and continuing calibration results, and all batch and matrix QC including field blanks, field duplicates, MS/MSD, matrix duplicates, surrogate recoveries, method blanks, LCS results, SRM results, and the identification and quantitation of specific compounds of interest. For the closed Equalization Lagoon and Chrome Plating Line Area Sampling, the data review will include a review of technical holding times, batch and matrix QC including field blanks, field duplicates, MS/MSD samples, matrix duplicates, surrogate recoveries, method blanks, LCS results, and a comparison to results from previous sampling events.

Additionally, MDL studies for all chemicals of concern in the matrices of interest will be performed by the analytical laboratory. These MDLs must support the project reporting limit requirements and have been performed within one year of the analysis of samples collected for the screening survey. The laboratory shall follow the MDL procedures as outlined in the Federal Register, Vol. 49, No. 209, October 26, 1984, pp.198-199 and associated laboratory QAPP SOPs.

18.2 Overall Assessment of Environmental Data

Data assessment will involve data evaluation and usability to determine if the data collected are of the appropriate quality, quantity and representativeness to support the screening survey. The affect of the loss of data deemed unacceptable for use, for whatever reason, will be discussed and decisions made on corrective action for potential data gaps. The QC results associated with each analytical parameter for each matrix type will be compared to the objectives presented in Sections 7 and 13 of this QAPP. Only data generated in association with QC results meeting these objectives and the data validation criteria will be considered usable.

Factors to be considered in the overall data assessment based on the DQOs in this QAPP and the data evaluation by the QA Officer will include, but not necessarily be limited to, the following:

- Were all samples obtained using the methodologies and SOPs proposed in the QAPP?
- Were all proposed analyses performed according to the SOPs provided in the QAPP?
- Were samples obtained from all proposed sampling locations planned?
- Do any analytical results exhibit elevated detection limits due to matrix interferences or contaminants present at high concentrations?
- Were all laboratory data evaluated according to the validation protocols, including project-specific QC objectives as defined in this QAPP?
- Which data sets were found to be unusable (qualified as "R") based on the data evaluation results?
- Which data sets were found to be usable as estimated data, (qualified as "J" or "UJ") based on the data evaluation results?
- Have sufficient data of appropriate quality been generated to support the project?
- Were all issues requiring corrective action, if any, fully resolved?
- Have any remaining data gaps been identified and summarized in the final report?

19.0 Data Usability/Reconciliation with Project Quality Objectives

The goal of this project is to (1) provide supplemental data for the evaluation and implementation of the RCRA Corrective Measures, (2) continue the RCRA Equalization Lagoon Post-Closure groundwater monitoring, and (3) continue groundwater monitoring for the Chrome Plating Line Area at the Grenada Stamping and Assembly Site. As such, the data generated must meet the data user's needs as defined in the project DQOs in Section 7 of this QAPP. In summary from Section 7, the primary objectives for assessing the usability of the data are (1) to collect data that are representative of Site conditions that can be combined with prior data; (2) to produce data that meet the project reporting limit requirements.

The QA Officer will apply the standard data validation qualifiers to data to indicate the level of uncertainty in the associated result. In general, for the purposes of the screening survey, data that are left unqualified, data qualified "U" (non-detected), data qualified "J" (detected as an estimated result), and data qualified "UJ" (non-detected at an estimated detection reporting limit) are considered valid and usable for project objectives. Data that are qualified "R" (rejected), due to severe exceedances of QC requirements, will be considered invalid and unusable.

The goal of this program is to generate valid, usable data. However, in environmental sampling and analysis, some data may be lost due to sampling location logistics, field or laboratory errors, or matrix effects that may cause the rejection of results for some compounds. The overall goal for completeness of collection of valid data is 90%. The QA Officer will assess the completeness of the overall data generation against the project goal of producing 90% of the planned data as valid and usable results. If this goal is not met, data gaps may exist that may compromise the intended use of the data.

20.0 Special Training Requirements/Certifications

The field sampling, field analysis, laboratory analyses, and data validation tasks are considered routine tasks and will be performed by a qualified environmental professional. Therefore, these tasks will not require any additional specialized Site-specific training.

The Project Health and Safety Plan requires that personnel working on project related field tasks be trained in accordance with the Occupational Safety and Health (OSHA) regulations. Prior to working on-Site all potential Site personnel will be required to submit certificates of OSHA training to the project manager.